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Object Lessons,

FOR TEACHERS IN PRIMARY SCHOOLS AND PRIMARY CLASSES.

BY A. S. WELCH,

PRINCIPAL OF MICHIGAN STATE NORMAL SCHOOL.

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Eliza H. Bertine
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OBJECT LESSONS:

PREPARED

FOR TEACHERS

OF

PRIMARY SCHOOLS AND PRIMARY CLASSES.

By A. S. WELCH,
PRINCIPAL OF MICHIGAN STATE NORMAL SCHOOL.

Intellectual progress is, of necessity, from the concrete to the abstract.

NEW YORK:
A. S. BARNES & BURR, PUBLISHERS,
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PREFACE.

The first instruction given to the child in school, should be based on the fact that his intellectual activity consists in seeing and hearing rather than in reasoning and reflecting. His restless curiosity about material things is natural and proper to childhood, and equally natural, also, is his aversion to abstract thinking. Any mode of teaching, therefore, which thwarts the former while it seeks to overcome the latter, is false in its philosophy and bad in its results. Since the senses of sight and hearing are first in exercise and development, the first step in school training should be to give them a systematic culture, and the period between the ages of five and ten years ought to be devoted mainly to this object.

The order of instruction which I have thus briefly indicated, was announced sixty years ago by Pestalozzi, an eminent Swiss teacher, as the only natural order. Since that time it has prevailed in the schools of Germany and England, and is now being adopted in the better class of schools in this country.

But the want of a suitable book, from which teachers could learn the best methods of training the senses of children by means of their appropriate objects, has proved a serious obstacle to the introduction of the Pestalozzian system into our primary schools. While lecturing on this subject before teachers' institutes and educational conventions held in different States of the West, I have been invariably met with the question, "Where shall we find the right book?"

It was this general inquiry that suggested the idea of publishing the series of Object Lessons which I had prepared in MS. for the experimental department of the Michigan State Normal School. These lessons have been given to large classes by the teachers of that department, and are found to answer fully the object designed. Similar lessons have also been given by normal pupils in various schools of the State, with similar success. It is hoped that the same matter, in the form of a book, will be equally acceptable to primary teachers generally. I may add that I have limited the number of pages, so that neither its price nor the time required for its perusal, shall operate as a hindrance to its circulation. The youngest teacher will be able to prepare additional object lessons at pleasure from the models furnished.

It is not intended that this book should supersede any of the text-books now in use. In following the plan of the first ninety pages, the teacher need not depart from the ordinary course of instruction first given to the child. I have only sought so to modify that course as to make it subserve the object of all primary instruction, namely, the cultivation of the senses of the pupil.

In the course of my labors I have consulted freely the English and German books on primary teaching, and in preparing my last sixty pages I have received valuable suggestions from the works of Miss Mayo.

I gladly acknowledge my obligations to Mr. John Goodison for his aid in the Drawing Lessons and in the first series of Lessons on Colors. I also proffer my hearty thanks to friends who have kindly commended the work in advance, especially to Mr. Wells, Superintendent of the Public Schools of Chicago, and to Mr. Gregory, Superintendent of Public Instruction for the State of Michigan.

A. S. WELCH.

STATE NORMAL SCHOOL, YPSILANTI,
January, 1862.

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THE Object Lessons of the first ninety pages, from the Features of the Face to the Alphabet in Drawing Lessons, inclusive, are intended to be given to children, as their first instruction in the school-room. As these lessons, however, involve exercises which are mostly new, they may, with great profit, be given to classes that have already learned the alphabet and made some progress in reading.

The lessons after page 90 may be given profitably to children less than twelve years of age, and those lessons throughout the book, which include exercises in Drawing, should be given to all the pupils of a district school.

Specific directions will be found at the beginning of each series of lessons, but a few general directions may be added.

1. Give the lessons in the order in which they stand.

2. Study each lesson carefully, so that you may be able to give, not the language, but the order and properties it presents, without the book.

3. If the lesson be on a visible object, always have that object at hand, where every child can inspect it.

4. Encourage the pupil to answer every question himself, and try to beget in him the habit of accuracy in expression.

5. Prepare yourself, if necessary, for giving the Lessons in Drawing by previous practice on the board. Your perseverance will be rewarded by your own improvement.

6. Let the Object Lessons harmonize with, rather than supersede, other exercises. They should aid, not hinder, the round of daily recitations.

7. Add lessons of your own to each series. The limits of this book leave much for you to do in this respect.

8. Be thoroughly in earnest. Vivacity is diffusive; so is dullness. Indifference on the part of the class, will be due to the teacher.

OBJECT LESSONS.

LESSON I.

THE class standing before the blackboard, the teacher prints the word

HAIR.

Teacher. Do you see, children, the word I have printed on the board?

Children. Yes, sir.

T. Will you remember it, if I tell you what it is?

C. Yes, sir.

T. Well, it is what grows upon each one of your heads; what is that?

C. Hair.

T. [*Pointing to the word.*] Look at the word and pronounce it. [*The children repeat the word several times after the teacher.*] Now, children, can you tell me what the hair on your head is good for?

A Little Boy. To keep our heads warm.

T. That is a brave answer. God makes hair grow to cover our heads and keep them warm. Now, can you tell me anything else that hair is good for? Think a minute. [*Children think but *can not answer.*] Well, if John hadn't any hair on his head, would he look as well as he does now?

C. No, sir.

T. Well, then, besides keeping our heads warm, hair is pleasant to look at. Hair is beautiful. [*The children all repeat.*] Hair is beautiful.

T. Now, then, let us talk about the color of hair. What is the color of Henry's hair? [*Pointing to a boy.*]

C. It is black.

T. What is the color of William's hair?

C. It is light.

T. What is the color of Anna's hair?

C. Brown, sir.

T. Yes, and Thomas' hair is auburn and James' is sandy and Helen's is light brown. Now tell me what the color of your grandfather's hair is.

A Boy. Gray.

T. Now repeat all these names of colors after me.

Black, Light, Brown, Auburn, Sandy, Light-brown. [*Teacher now prints the words of one syllable on the board in a column and makes the children repeat them after him until they are familiar with the form of each.*]

LESSON II.

Teacher. Well, children, do you remember what we talked about yesterday?

Children. Yes, sir; we talked about hair.

T. Very well. To-day we will talk about the eyes. [*Prints the word* EYES *upon the board, points to it, and makes them repeat it several times.*] Now, can you tell me what your eyes are good for?

C. Good to see with.

T. Very well. Can you think of anything else they are good for? When a boy is angry, do his eyes look just as they do when he is pleased and good-natured?

C. No, sir.

T. When a little girl cries, do her eyes look just as they do when she smiles?

C. No, sir.

T. Well, then, our eyes are good to show our feelings. When a little boy feels happy, I can see it in his eyes. When he has trouble, I can see it in in his eyes too. Whether he is kind and pleasant, or sour and surly, it all shines out from his eyes. Now, what do you call these little shutters that close over your eyes when you sleep and open when you wake?

C. Eyelids.

T. Well, think now what your eyelids are good for. George, suppose you had no eyelids at all and you were obliged to sleep with your eyes wide open, would any harm come of it?

George. Yes, sir; things would get into my eyes and hurt them.

T. Yes, indeed; and when you were awake, the dust, and snow, and everything that is floating in the air would be driven into your eyes and they would soon be spoiled. So you see the eyelids are good to keep the eyes safe from all harm. What are the eyelids good for?

C. To keep the eyes safe from all harm.

T. Yes; and those fringes of hair that you have on the edges of your eyelids, what are they called?

C. Eyelashes.

T. Well, eyelashes help to keep the dust out of your eyes too. Now tell me what is the shape of your eyes.

C. Round like a ball.

T. Let us next see whether your eyes are set in the best place for seeing things. Look at Thomas' eyes and tell me what part of his face they are in. You see that they are placed just under his forehead and one on each side of his nose. You see each eye is set in a large hole and can turn every way to look at things. Now, if anybody should strike Thomas on this part of his face with a club [*places a ruler across his eyes*], would he hit his eyes or his nose and forehead?

C. Hit his nose and forehead.

T. So you see the bones of the nose and forehead stand out beyond the eyes and keep them from being hurt by dust. How many things, have I said, keep the eyes safe from harm?

C. Four.

T. What are they?

C. Eyelids, eyelashes, nose, and forehead.

LESSON III.

Teacher. Let us see, to-day, if we could find as good a place for them anywhere else. Suppose, for instance, your eyes were put in the back of your head instead of the front, what would you gain by it?

Charles. I could see behind me without turning my head around.

T. True, but you could not see before you; and which way does a boy want to see most? Of course the way he walks, or he would stumble over everything in his way; and then, again, if your eyes were in the back of your head, you could never see to eat. Would your eyes be as safe from hurt in the back of your head as where they are?

Children. No, sir.

T. Think hard and tell me what danger a boy's eyes would be in if they were set in the back of his head.

Charles. Every time he bumped his head behind, he would knock his eyes out.

T. Well, what else?

Mary. His hair would get in his eyes and make him blind.

George. Every time his mother combed his hair, she would scratch his eyes out.

T. Very well; now, would it be better to have his eyes in his hands? Then, by turning his hands he could see every way. But if he tried to feel of anything, what would happen to his eyes?

Mary. He would put them out.

T. If he went to catch a ball, what then?

C. It would come pat, right into his eyes.

T. What if he went to shake hands with anybody?

C. It would put his eyes out.

T. So we find there could be no better place for the eyes than where they are. Now, let me see if you can tell the color of each pair of eyes in the class. Arthur, come here and stand where the light will shine into your face. Now, little people, all look at his eyes; what color are they?

C. Black, sir.

T. [*Prints the word* BLACK *plainly on the board and makes the children look at and repeat it.*] John, come here, and let the rest look at your eyes. What color are John's eyes, children?

C. Blue, sir.

T. [*Prints the word, makes them repeat it, and keeps their attention upon it until they are perfectly familiar with its form.*] Look carefully. Are John's eyes light blue or dark blue, Thomas?

Thomas. Light blue.

T. Very well. [*Prints* LIGHT BLUE *and makes them repeat it many times, as before.*] Now, Anna, we will look at your eyes. What color are Anna's eyes?

All. Blue.

T. Yes; but you see they are a different kind of blue from John's. Are Anna's eyes light blue or dark blue?

C. Dark blue.

T. Right. We will print the words and practice them awhile. Now, we will see what is the color of Rose's eyes. What is it?

C. Brown.

T. Right. We will print and practice again.

LESSON IV.

Teacher. To-day, children, we will have a lesson on noses. First, let us print the word on the board and pronounce it until we know it thoroughly. Very well. Now we will name some of the parts of the nose. This long part, just below where your nose meets your forehead, is called the bridge of the nose. What is this part called, children?

Children. The bridge of the nose.

T. And the end here is called the tip of the nose. What is it called?

C. The tip of the nose.

T. And these two holes here are called the nostrils. What are they called?

C. The nostrils.

T. Repeat all the names of the parts I have given you. [*Prints them.*]

C. The bridge of the nose, the tip of the nose, and the nostrils.

T. [*After making the children repeat the words* *until they are perfectly familiar with the printed forms.*] Shall I tell you next something about the different kinds of noses which different people have? First, a very small, short nose, with a blunt tip like this [*draws a profile*], is called a pug nose. What is it called?

C. A pug nose.

T. And a nose that is straight from the forehead to the tip, like the one in this [*draws a profile*], is called a Grecian nose. What is a straight nose called?

C. A Grecian nose.

T. And a nose that is curved from the place where it meets the forehead to the tip, like the nose in this face, is called a Roman nose. What is a curved nose called?

C. A Roman nose.

T. Now repeat; a small, blunt nose is called what?

C. A pug nose.

T. A nose that is straight from the forehead to the tip is called what?

C. A Grecian nose.

T. A nose that is curved from the forehead to the tip is—

C. A Roman nose.

T. Now for a reading lesson. [*Prints on the board.*]

THIS BOY HAS A PUG NOSE.

THIS MAN HAS A STRAIGHT NOSE.

THAT GIRL HAS A SHORT NOSE.

LESSON V.

Teacher. You may next tell me what the nose is good for.

Children. Good to smell with.

T. Is it good for nothing else? Shut your mouths tight. Now, how do you breathe?

C. Through our noses.

T. What else, then, besides smelling, is the nose good for?

C. Good to breathe through.

T. Well, then, we will print and read—

THE NOSE IS GOOD TO SMELL WITH.
THE NOSE IS GOOD TO BREATHE THROUGH.

We will now inquire whether the nose is put on right. Where are your noses placed?

C. In the middle of our faces.

T. Yes; and you see the nostrils are placed right over the mouth. Can you tell the reason of that? I will tell you. They are so placed, that when we go to put any bad food into our mouths, we may find out that it is bad by the smell. For instance, if we were going to eat a bit of meat that was hurt from being kept too long, how should we find out that it was hurt?

C. By the bad smell.

T. Yes; and as the meat is raised to the mouth, then the nostrils have just the place to catch the bad odor. The nose, then, holds a sort of guard or watch over the mouth to keep things that are hurtful out of it. Who can give another reason for the nose being placed as it is? In the summer, you know, thousands of flowers spring up out of the ground and open their leaves to the sun, and nearly every flower has an odor. Is the smell of a flower pleasant or unpleasant?

C. Pleasant.

T. Well, all the flowers in the fields and woods and gardens send out pleasant odors; can you guess whether these odors go down toward the earth or rise into the air?

C. They rise into the air.

T. Very well, then, the nose is so placed that it can catch the odors as they rise. Why are the nostrils placed where they are?

C. To catch the pleasant odors of flowers, as they rise.

T. If the nose were turned the other side up, could it catch the smell of flowers then?

C. No, sir.

T. Can you think of anything we should gain if our noses were put on the other side up?

Susan. We could take snuff better.

T. Yes; but snuff-taking is a very untidy habit and, besides, it is bad for our health. Can you think of anything else we should gain by having our noses the other side up?

C. No, sir.

T. Can you think of any harm that would come of it?

George. When it snowed or rained it would fall into our noses and make us sneeze.

T. Right; you would be obliged to have a lid put on to keep the snow and rain out. So you see, nothing about the nose could be changed for the better.

LESSON VI.

Teacher. Our next lesson is the mouth and first we will name all the parts. What are these called?

Children. Lips.

T. [*Prints the words* LIP *and* LIPS, *and makes them pronounce until they are quite familiar with the forms.*] Now, what is the name of these?

C. Teeth.

T. [*Prints the words* TOOTH *and* TEETH, *and makes them pronounce in the same manner.*] Now, what is the name of this?

C. Tongue.

[*The teacher prints the word* TONGUE, *and makes them pronounce in the same manner.*]

LESSON VII.

Teacher. Now, let us talk about the lips. What are the lips used for? There is a little girl smiling. How can you tell when she smiles? Is it not by the shape of her lips? You see they are open a little and turned up at the corners. She smiles with her lips; what, then, are the lips used for?

Children. Used to smile with.

T. Well; are they good for anything else? If a man had no lips, his teeth would always be bare and his face wouldn't be a pleasant thing to look at, would it?

C. No, sir.

T. But, as we all have lips, they hide our teeth, except when we talk or smile or laugh. What else, then, are the lips good for?

Charles. Good to cover our teeth.

T. Yes; are they good for something else still? When we talk we make a good many sounds with our lips. Say *paper*, all of you.

C. *Paper*.

T. What did you pronounce the word with?

C. With our lips.

T. What else, then, are the lips good for?

C. Good to talk with.

READING LESSON.

OUR LIPS ARE RED.
WHAT ARE THE LIPS USED FOR?
THE LIPS ARE USED TO SMILE WITH.
WHAT ELSE ARE THE LIPS USED FOR?
THE LIPS ARE USED TO HIDE THE TEETH.
WHAT ELSE ARE THE LIPS USED FOR?
THE LIPS ARE GOOD TO TALK WITH.

LESSON VIII.

Teacher. Now let us have a talk about the teeth. Can any little boy tell us how many teeth he has? Well, I will tell you. (About twenty-eight.) How many teeth have we?

Children. Twenty-eight.

T. Well, these teeth in front are called single teeth, and these larger teeth back are called double teeth. What are these front teeth called?

C. Single teeth.

T. And the back ones?

C. Double teeth.

T. Which would you use to bite off a piece of an apple with, the single teeth or the double teeth?

C. The single teeth.

T. Which would you chew the piece of apple with, the single teeth or the double teeth?

C. The double teeth.

T. Yes; you see the double teeth are large and blunt, so that they can grind up the food, while the single teeth are sharp for biting off things that are good to eat. Now tell me what the double teeth and the single teeth are good for.

C. The single teeth are good for biting off food, and the double teeth are good for chewing it.

T. Let us now see if there is anything else the single teeth are good for. Pronounce the word *favor.*

C. Favor.

T. How do you make this word?

C. With our upper teeth and under lip.

T. So, you see, we use the front teeth to help us talk, as well as the lips.

LESSON IX.

Teacher. Our next lesson shall be about the tongue. What is the color of your tongue?

Children. Red.

T. When you are sick, what is its color?

C. White.

T. What is the tongue good for?

C. Good to taste with.

T. Yes. What is the end of your tongue called?

C. The tip.

T. Yes. See what an active thing the tongue is. The tip of it is always wandering about to every part of the mouth, sometimes touching the front teeth, sometimes the roof of the mouth, and it occasionally runs out to wet the lips when they get too dry. But, besides all this, the tongue has other important business to attend to. The fact is, we do most of our talking with this little instrument. Say *teeth*, all of you.

C. *Teeth.*

T. What did you say it with?

C. Our tongues.

T. Where did you put your tongues in order to say *teeth?*

C. Against the roof of our mouths, just back of our front teeth.

T. Right. And you do the same thing in saying many other words.

[*Let the children pronounce the following words, to show them the use of the tongue.*]

TATTLE	DATE	THAT	INDITE
TRADE	TATTER	THOSE	DAUGHTER
DO	TATTOO	DOLLAR	DEAL.

LESSON X.

Teacher. Now, how many things have we talked about, that belong to the mouth?

Children. Three—lips, teeth, and tongue.

T. There is one more that we use to taste and talk with. It is called the palate. It looks a little like the tongue, but is very much smaller. It is placed so far back in the mouth that we can not see it without a little trouble. It hangs from the upper part of the mouth, just where the throat begins. We taste everything we swallow with the palate and, as I told you before, we use the palate when we talk. Say *cake*, all of you.

C. Cake.

T. Now where did you make the word?

C. Back in our mouths.

T. Now all say *hack.* [*Children repeat.*] Where did you make that word?

C. In the back part of our mouths.

T. Well, then, you made it with your palate.

LESSON XI.

Teacher. To-day we will pronounce words with our lips, tongue, and palate. Say *puppy.* [*Children repeat.*] What did you say that word with?

Children. With our lips.

T. Well, we will write a column or two of words to pronounce with our lips.

PUFF
PAVE
PA

BOO
MOP
PEPPER

FAVOR
BABY
PAPER

VAPOR
PAPA
PUPPY.

[*These words should be printed in columns, so that the pupils may learn their forms while they are thoroughly drilled in pronouncing them. No exercise will more effectively cure those habits of defective articulation which most children have acquired at this age. At the same time they will learn the use of these organs in reading. The above is our first lesson in elocution.*]

LESSON XII.

Teacher. This morning, children, let us see what words we can make with the tongue. [*Prints the* *word* TALL *on the board.*] Put your tongue against the roof of your mouth, near the front teeth. Now say *tall*, all of you together, when I make the signal.

Children. Tall, Tall, Tall.

T. How did you speak the word?

C. With our tongues.

T. Very well. Let us next see what tongue-words we can find for practice. Pronounce and repeat very distinctly. [*Teacher prints.*]

TEA
DAY
TROT
DATE
SAID
SOUL
SAT
CENT
TALL
LANE
TENT
DINT
JADE
JAR
JOLLY
DOLL
TOOTH
TEETH
TROTH
DOLLAR
TELLER
TALLOW
DULLNESS
STROLLER.

LESSON XIII.

Teacher. You remember, children, we found the palate in the back part of the mouth, hanging just over the root of the tongue. You remember I told you that we use the palate to taste the food that we swallow. Did I tell you what else we do with it?

Children. Yes, sir; we talk with it.

T. Very well. We will practice, to-day, on words that we make with the palate. [*Print and make the class repeat and re-repeat in concert the following.*]

GUY
GO
COW
GAG
KEG
KICK
COOK
COG
CAKE
GIG
GAWK
GAWKY
GAGGING
KICKING
COOKING
CRACKING.

LESSON XIV.

REMARKS.—The teacher will notice here that a dot (·) placed over a consonant, denotes a pure consonant sound, which is to be enunciated by contact of the organs of speech, and without the aid of a vowel sound.

If the teacher is not accustomed to this mode of uttering the pure consonants, he can make himself familiar with it, by a little careful practice.

The author has found by repeated trial that children learn to make, *with great facility*, all the pure elementary sounds, and that they can easily be taught to combine these into spoken words before they have learned the alphabet of characters.

In fact, it is only by this means that we can give the written alphabet *any meaning* for the pupil, when he first attempts to learn it.

Great care should be taken, in giving these lessons, that the class repeat each exercise until all the pupils can make every sound and combination which it contains, readily and perfectly. We shall place the usual marks over the vowels.

Teacher. We will now produce some other sounds that are neither lip sounds, nor tongue sounds, nor palate sounds, but are made with the mouth open. Listen. ā ā ā ā ā. Repeat.

Children. ā ā ā ā ā ā ā ā.

T. How was that sound made?

C. With the mouth open.

T. What shall we call the sounds that are made with the mouth more or less open? Will you remember if I tell you?

C. We will try, sir.

T. Well, then, sounds made with the mouth open, are vowel sounds or vowels. What are they?

C. Vowel sounds or vowels.

T. What is ā ā ā ā?

C. ā ā ā is a vowel sound.

T. Now try another vowel sound, ē ē ē ē ē.

C. ē ē ē ē ē.

T. Repeat ē ē ē.

C. ē ē ē.

T. What is ē, then?

C. ē is a vowel sound.

T. Now say ī ī ī ī ī.

C. ī ī ī ī ī ī ī.

T. What is ī?

C. A vowel.

T. Why?

C. We made it with our mouths open.

T. Next say ō ō ō ō ō.

C. ō ō ō ō ō ō ō.

T. What is ō?

C. A vowel sound.

T. Now make ū ū ū ū ū.

C. ū ū ū ū ū ū ū.

LESSON XV.

LIP SOUNDS.—P.

Teacher. Now, children, we will try to learn separately, the sounds we make with our lips, and we will practice them so carefully that each one can make them without help. Will you try hard?

Children. Yes, sir.

T. Well, then, every time I touch the table with my finger, all say *Pie.*

C. Pie, Pie, Pie.

T. What do you make the beginning of the word with?

C. With our lips.

T. Now listen. We will call every sound which we make with our lips, a lip sound. What shall we call sounds made with the lips?

C. Lip sounds.

T. We will now try to make the lip sound that *pie* begins with *alone.* [*Teacher makes the sound represented by* ṗ, *without the vowel.*] Make the same sound.

C. ṗ ṗ ṗ ṗ.

T. What kind of a sound is ṗ?

C. A lip sound.

T. Make it again.

C. ṗ ṗ ṗ ṗ.

T. Very well. Say ā ā ā ā.

C. ā ā ā ā.

T. Now say ṗ–ā.

C. ṗ–ā.

T. Again—ṗ–ā pā, ṗ–ā pā.

C. ṗ–ā pā, ṗ–ā pā.

T. Now pronounce ē ē ē ē.

C. ē ē ē ē.

T. Now—ṗ–ē pē, ṗ–ē pē.

C. ṗ–ē pē, ṗ–ē pē.

T. Repeat—ṗ–ē pē, ṗ–ē pē.

C. ṗ–ē pē, ṗ–ē pē.

T. Now pronounce ī ī ī ī.

C. ī ī ī ī.

T. Now—ṗ–ī pī, ṗ–ī pī.

C. ṗ–ī pī, ṗ–ī pī.

T. Now—ō ō ō ō ō.

C. ō ō ō ō ō.

T. Now—ṗ–ō pō, ṗ–ō pō.

C. ṗ–ō pō, ṗ–ō pō.

T. Now—ū ū ū ū ū ū.

C. ū ū ū ū ū.

T. ṗ–ū pū, ṗ–ū pū.

C. ṗ–ū pū, ṗ–ū pū.

LESSON XVI.

LIP SOUNDS.—Ḃ AND V̇.

Teacher. We will try another lip sound. Make this sound as I do—ḃ ḃ ḃ ḃ. Notice that ḃ is made with the lips tightly closed. Try it now—ḃ ḃ.

Children. ḃ ḃ ḃ ḃ.

T. Right. What kind of a sound is ḃ?

C. A lip sound.

T. Why?

C. We made it with our lips.

T. Well. Next, all sound after me—ā ē.

C. ā ē.

T. ā ē ī.

C. ā ē ī.

T. ā ē ī ō.

C. ā ē ī ō.

T. ā ē ī ō ū.

C. ā ē ī ō ū.

T. You see that we make all these sounds with the mouth open. What are they?

C. Vowels.

T. Now spell with me—

ḃ–ā bā
ḃ–ē bē
ḃ–ī bī
ḃ–ō bō
ḃ–ū bū.

T. Try another sound which is a good deal like the last one—v̇ v̇ v̇ v̇. This sound is made by pressing the upper teeth hard on the under lip. What is it, then?

C. A lip sound.

T. Make it in this way—v̇ v̇ v̇ v̇ v̇.

C. v̇ v̇ v̇ v̇.

T. Once more—v̇ v̇ v̇ v̇.

C. v̇ v̇ v̇ v̇.

T. Now— v̇–ā vā
v̇–ē vē
v̇–ī vī
v̇–ō vō
v̇–ū vū.

[*The teacher should have the class review the above exercises until the children are quite familiar with them.*]

LESSON XVII.

LIP SOUNDS.—Ḟ, Ṁ.

Teacher. Let us make a new lip sound. You see I put my teeth against my under lip—ḟ ḟ ḟ ḟ ḟ. Try it.

C. ḟ ḟ ḟ ḟ ḟ ḟ ḟ.

T. Again.

C. ḟ ḟ ḟ ḟ ḟ ḟ.

T. Now pronounce after me—

ḟ–ā fā
ḟ–ē fē
ḟ–ī fī
ḟ–ō fō
ḟ–ū fū.

T. Take another lip sound made by holding the lips closed—ṁ ṁ ṁ ṁ. Now.

C. ṁ ṁ ṁ ṁ.

T. After me say—

ṁ–ā mā
ṁ–ē mē
ṁ–ī mī
ṁ–ō mō
ṁ–ū mū.

LESSON XVIII.

LIP SOUNDS.—Ẇ, WH.

Teacher. In this lesson I will give you two more lip sounds. The first is ẇ ẇ ẇ ẇ ẇ. Look at my lips as I sound it. ẇ ẇ ẇ. Now.

Children. ẇ ẇ ẇ ẇ ẇ ẇ ẇ.

T. Again.

C. ẇ ẇ ẇ ẇ ẇ.

T. Spell with me—

ẇ–ă wă
ẇ–ĕ wĕ
ẇ–ĭ wĭ
ẇ–ŏ wŏ
ẇ–ŭ wŭ.

T. The next sound is like the last, only a little rougher—ẇh ẇh ẇh ẇh. Look—ẇh ẇh.

C. ẇh ẇh ẇh ẇh.

T. Now with me—

ẇh–ă whă
ẇh–ĕ whĕ
ẇh–ĭ whĭ
ẇh–ŏ whŏ
ẇh–ŭ whŭ.

LESSON XIX.

TONGUE SOUNDS.—T, D.

Teacher. Our next exercise will be on some of the sounds which we make with the tongue. They are easy to make. Make ṫ ṫ ṫ ṫ.

Children. ṫ ṫ ṫ ṫ ṫ ṫ.

T. Now with me—

ṫ–ă tă
ṫ–ĕ tĕ
ṫ–ĭ tĭ
ṫ–ŏ tŏ
ṫ–ŭ tŭ.

T. The next tongue sound is ḋ ḋ ḋ ḋ ḋ.

C. ḋ ḋ ḋ ḋ ḋ ḋ.

T. Now—
ḋ–ā dā
ḋ–ē dē
ḋ–ī dī
ḋ–ō dō
ḋ–ū dū.

LESSON XX.

TONGUE SOUNDS.—ṡ, ż.

Teacher. Say ṡ ṡ ṡ ṡ ṡ ṡ ṡ ṡ ṡ ṡ.

Children. ṡ ṡ ṡ ṡ ṡ ṡ ṡ ṡ.

[*This sound should be made quick and short.*]

ṡ–ā sā
ṡ–ē sē
ṡ–ī sī
ṡ–ō sō
ṡ–ū sū.

T. Say ż ż ż ż ż ż.

C. ż ż ż ż ż ż ż ż ż.

T. Now—
ż–ā zā
ż–ē zē
ż–ī zī
ż–ō zō
ż–ū zū.

LESSON XXI.

TONGUE SOUNDS.—Ṅ, L̇.

Teacher. ṅ ṅ ṅ ṅ ṅ.
Children. ṅ ṅ ṅ ṅ ṅ.
T. Now— ṅ–ā nā
ṅ–ē nē
ṅ–ī nī
ṅ–ō nō
ṅ–ū nū.

T. l̇ l̇ l̇ l̇ l̇ l̇.
C. l̇ l̇ l̇ l̇ l̇ l̇.
T. Now— l̇–ā lā
l̇–ē lē
l̇–ī lī
l̇–ō lō
l̇–ū lū.

LESSON XXII.

TONGUE SOUNDS.—TḢ ROUGH, TḢ SMOOTH.

Teacher. I will give you two more tongue sounds to-day, children. Pronounce the word *Thin.*

Children. Thin, Thin, Thin.

T. Listen while I make the sound that the word *thin* begins with—tḣ tḣ tḣ tḣ tḣ. Now all try.

C. tḣ tḣ tḣ tḣ tḣ tḣ.

T. Spell— tḣ–ā thā
tḣ–ē thē
tḣ–ī thī
tḣ–ō thō
tḣ–ū thū.

T. Next pronounce *Then, Then, Then.*

C. Then, Then, Then, Then.

T. Very well. Let us try the sound that ***then*** begins with—tḣ tḣ tḣ tḣ tḣ.

C. tḣ tḣ tḣ tḣ tḣ tḣ tḣ.

T. Spell— tḣ–ā thā
tḣ–ē thē
tḣ–ī thī
tḣ–ō thō
tḣ–ū thū.

LESSON XXIII.

TONGUE SOUNDS.—SH, CH AS IN CHURCH.

Teacher. Imitate sḣ sḣ sḣ sḣ sḣ sḣ.

Children. sḣ sḣ sḣ sḣ sḣ sḣ sḣ.

[*This sound should be made short and quick.*]

T. Spell— sḣ–ā shā
sḣ–ē shē
sḣ–ī shī
sḣ–ō shō
sḣ–ū shū.

T. Next make ċh ċh ċh ċh.
C. ċh ċh ċh ċh ċh.
T. Spell— ċh–ā chā
ċh–ē chē
ċh–ī chī
ċh–ō chō
ċh–ū chū.

LESSON XXIV.

TONGUE SOUNDS.—J̇, Ḣ.

Teacher. We have only two more tongue sounds to make. They are j̇ and ḣ. Say j̇ j̇ j̇ j̇ j̇.

Children. j̇ j̇ j̇ j̇ j̇ j̇ j̇ j̇.
T. Spell— j̇–ā jā
j̇–ē jē
j̇–ī jī
j̇–ō jō
j̇–ū jū.

T. Now the other—ḣ ḣ ḣ ḣ ḣ.
C. ḣ ḣ ḣ ḣ ḣ ḣ ḣ ḣ ḣ ḣ.
T. Now— ḣ–ā hā
ḣ–ē hē
ḣ–ī hī
ḣ–ō hō
ḣ–ū hū.

LESSON XXV.

THE PALATAL SOUNDS.—K̇, Ġ HARD, AS IN GET.

Teacher. We have come at last, children, to the palatal sounds. There are only two of them and so we can easily learn them very thoroughly. You remember where the palate is?

Children. Yes, sir; just over the root of the tongue.

T. Well, then, say k̇ k̇ k̇ k̇ k̇ k̇.

C. k̇ k̇ k̇ k̇ k̇ k̇ k̇ k̇ k̇ k̇ k̇.

T. What do you make k̇ with?

C. With our palates.

T. What is it, then?

C. A palatal sound.

T. Then spell— k̇–ā kā
k̇–ē kē
k̇–ī kī
k̇–ō kō
k̇–ū kū.

T. Now make another palatal sound and you will have the last one of all the sounds we make when we talk. Say ġ ġ ġ ġ ġ.

C. ġ ġ ġ ġ ġ ġ ġ.

T. Now spell— ġ–ā gā
ġ–ē gē
ġ–ī gī
ġ–ō gō
ġ–ū gū.

LESSON XXVI.

SHORT VOWEL SOUNDS.

Teacher. Sound ă ă ă.
Children. ă ă ă ă.
T. ĕ ĕ ĕ.
C. ĕ ĕ ĕ ĕ ĕ.
T. ĭ ĭ ĭ ĭ.
C. ĭ ĭ ĭ ĭ.
T. ŏ ŏ ŏ ŏ ŏ.
C. ŏ ŏ ŏ ŏ.
T. ŭ ŭ ŭ.
C. ŭ ŭ ŭ ŭ.

LESSON XXVII.

SHORT VOWELS AND LIP SOUNDS.

[*Exercise the class as in the foregoing lessons.*]

ă–ṗ	ăp	ă–ḃ	ăb	ă–v̇	ăv
ĕ–ṗ	ĕp	ĕ–ḃ	ĕb	ĕ–v̇	ĕv
ĭ–ṗ	ĭp	ĭ–ḃ	ĭb	ĭ–v̇	ĭv
ŏ–ṗ	ŏp	ŏ–ḃ	ŏb	ŏ–v̇	ŏv
ŭ–ṗ	ŭp	ŭ–ḃ	ŭb	ŭ–v̇	ŭv.

LESSON XXVIII.

SHORT VOWELS AND LIP SOUNDS.

ă–ḟ	ăf	ă–ṁ	ăm
ĕ–ḟ	ĕf	ĕ–ṁ	ĕm
ĭ–ḟ	ĭf	ĭ–ṁ	ĭm
ŏ–ḟ	ŏf	ŏ–ṁ	ŏm
ŭ–ḟ	ŭf	ŭ–ṁ	ŭm.

LESSON XXIX.

SHORT VOWELS AND TONGUE SOUNDS.

ă–ṫ	ăt	ă–ḋ	ăd	ă–ṡ	ăs
ĕ–ṫ	ĕt	ĕ–ḋ	ĕd	ĕ–ṡ	ĕs
ĭ–ṫ	ĭt	ĭ–ḋ	ĭd	ĭ–ṡ	ĭs
ŏ–ṫ	ŏt	ŏ–ḋ	ŏd	ŏ–ṡ	ŏs
ŭ–ṫ	ŭt	ŭ–ḋ	ŭd	ŭ–ṡ	ŭs.

LESSON XXX.

SHORT VOWELS AND TONGUE SOUNDS.

ă–ż	ăz	ă–ṅ	ăn	ă–l̇	ăl
ĕ–ż	ĕz	ĕ–ṅ	ĕn	ĕ–l̇	ĕl
ĭ–ż	ĭz	ĭ–ṅ	ĭn	ĭ–l̇	ĭl
ŏ–ż	ŏz	ŏ–ṅ	ŏn	ŏ–l̇	ŏl
ŭ–ż	ŭz	ŭ–ṅ	ŭn	ŭ–l̇	ŭl.

LESSON XXXI.

SHORT VOWELS AND TONGUE SOUNDS.

SMOOTH.		HARD.			
ă–tḣ	ăth	ă–tḣ	ăth	ă–sḣ	ăsh
ĕ–tḣ	ĕth	ĕ–tḣ	ĕth	ĕ–sḣ	ĕsh
ĭ–tḣ	ĭth	ĭ–tḣ	ĭth	ĭ–sḣ	ĭsh
ŏ–tḣ	ŏth	ŏ–tḣ	ŏth	ŏ–sḣ	ŏsh
ŭ–tḣ	ŭth	ŭ–tḣ	ŭth	ŭ–sḣ	ŭsh.

LESSON XXXII.

SHORT VOWELS AND TONGUE SOUNDS.

CH AS IN CHURCH.

ă–ċh ăch ă–j̇ ăj
ĕ–ċh ĕch ĕ–j̇ ĕj
ĭ–ċh ĭch ĭ–j̇ ĭj
ŏ–ċh ŏch ŏ–j̇ ŏj
ŭ–ċh ŭch ŭ–j̇ ŭj.

LESSON XXXIII.

SHORT VOWELS AND PALATAL SOUNDS.

ă–k̇ ăk ă–ġ ăg
ĕ–k̇ ĕk ĕ–ġ ĕg
ĭ–k̇ ĭk ĭ–ġ ĭg
ŏ–k̇ ŏk ŏ–ġ ŏg
ŭ–k̇ ŭk ŭ–ġ ŭg.

The teacher should now give his pupils the above consonant sounds combined with the remaining vowels. Such are a̤ in fa̤ll, ö in möve, ṳ in pṳll, ou in house, etc., etc. Next, words of three sounds may be given for practice. Those words which have a meaning are the best, *e. g.*, HAT, MAT, CAT, etc.

PART SECOND.

DRAWING LESSONS PREPARATORY TO LEARNING THE ALPHABET.

The teacher may now give specific lessons on form. The purpose of these lessons is to beget in the pupil the habit of attending carefully to the shapes of the various objects around him. Since curiosity, which is so strong in the child, seeks its gratification in finding new forms, it is the more easy and natural to use these as a means of training his eye to quickness and accuracy of observation.

The child will thus be prepared for learning the alphabet by lessons in drawing. Let the teacher be mindful also that in giving these lessons he is laying the foundation for scholarship in all those sciences which present their objects to the eye. Such are Natural History, Botany, Geology, etc.

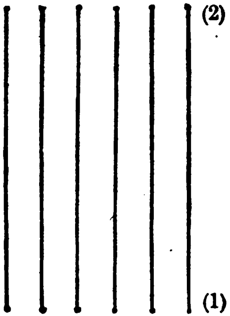
Every visible object is bounded by lines which enable the observer to determine its shape. If these lines are straight or curved, the shape of the object is regular; if broken, the shape is irregular. The elements, then, of form are lines, straight, curved, or broken, and these, therefore, will furnish the material for our first lessons.

Let the children stand at the blackboard, crayon or chalk in hand, and draw each line from a model made by the teacher. Every child can learn to draw at a very early age, and the exercise greatly increases his interest in other objects of study.

LESSON I.

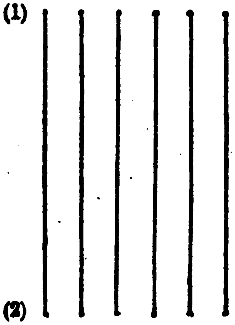
PERPENDICULAR LINES.

Make on the board two points, one being six inches above the other. At the word *one* let each pupil make the lower point; at the word *two*, the upper; at the word *three*, all draw quickly a line from the upper to the lower point.



In this manner, as the teacher says *one*, *two*, *three*; *one*, *two*, *three*, additional lines are drawn in concert, each line being parallel to the first.

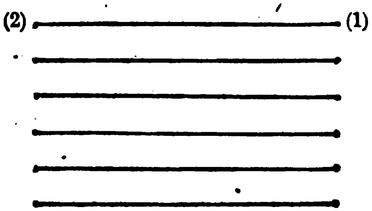
Now reverse the process and at the words *one*, *two*, *three*, all make the upper point; then the lower; then draw the line from the lower upward.



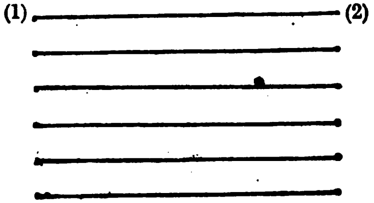
LESSON II.

HORIZONTAL LINES.

At the word *one* make a point in concert; *two*, another point six inches at the left; *three*, draw a straight line from the left point to the right. All added lines should be parallel.



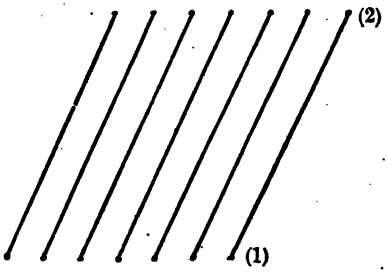
Reverse the process and draw to the left as the teacher repeats *one*, *two*, *three*.



LESSON III.

OBLIQUE STRAIGHT LINES.

At the word *one* let each pupil make the lower point; at the word *two*, the upper a little to the right of the lower; at the word *three*, all draw a line quickly from the upper to the lower point.

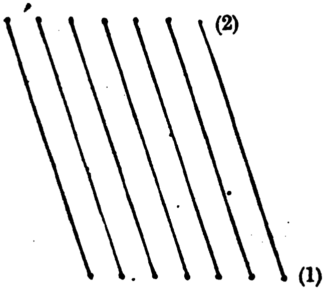


The teacher repeating *one*, *two*, *three*, let the pupils make additional parallel lines.

LESSON IV.

OBLIQUE LINES.

At the word *one*, all make the lower point; at the word *two*, the upper at the left; at the word *three*, they draw a line rapidly from the upper to the lower point.

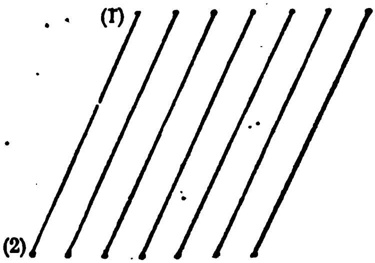


The teacher repeating *one*, *two*, *three*, all make additional parallel lines.

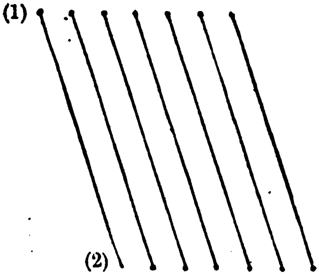
LESSON V.

OBLIQUE LINES.

The pupils now draw the lines in Lessons III. and IV. from the lower point to the upper. At the word *one*, all make the upper point; at the word *two*, the lower at the left; at the word *three*, draw the line from the lower to the upper point. Make additional lines in the same manner.



In the same way draw lines upward, with the lower point at the right.



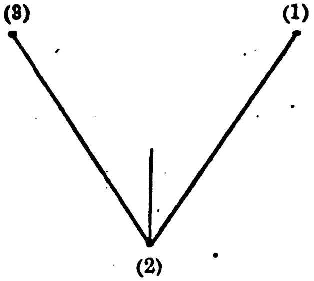
LESSON VI.

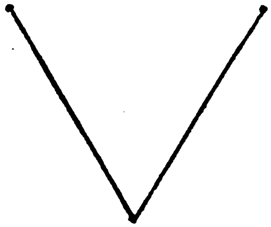
BROKEN LINES.

A broken line is composed of two or more straight lines at angles to each other.

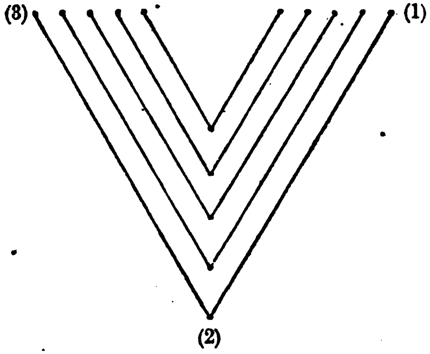
The class draw them as follows:

At the word *one*, a point; *two*, a point below at the left; *three*, a point above at the left; at the word *four*, draw a line from 3 to 2; at the word *five*, from 2 to 1.



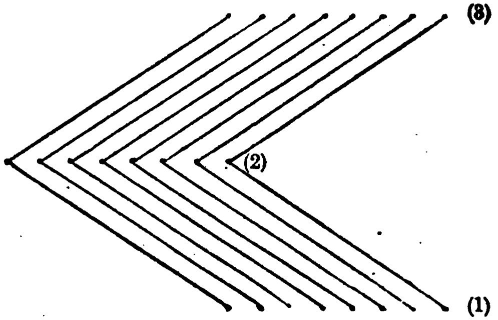


Draw numerous lines in the same way, keeping them parallel to each other.

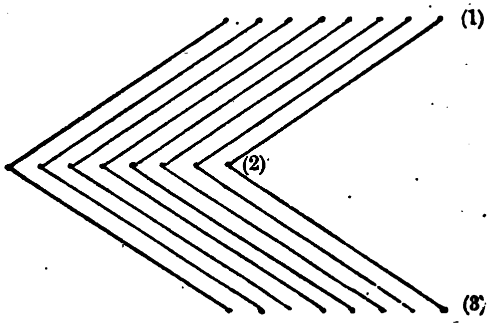


Now change the arrangement of the points and let the class draw at the word, as follows:

One, point; *two*, point above at the left; *three*, above at the right; *four*, draw from 3 to 2; *five*, from 2 to 1. Continue to add parallel lines.

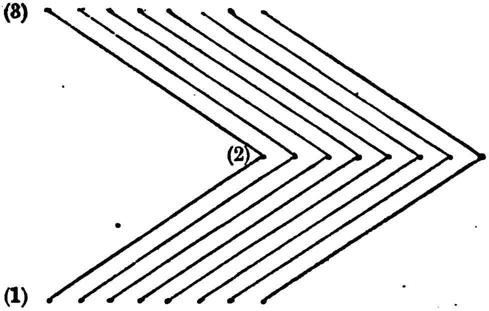


Reverse the process by making the upper point first and drawing from below upward.

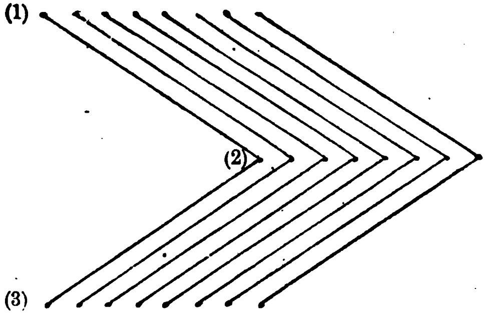


The teacher may here show the difference between a broken line and a crooked line.

Now make the second point on the right and the third on the left, and draw downward at the words.



Next make the first point above and draw upward.

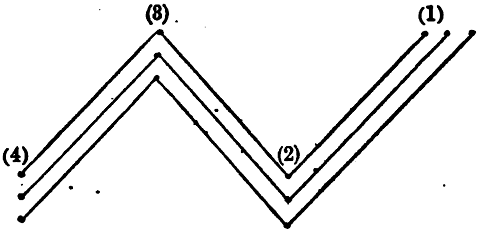


Care should be taken that all the pupils make lines of uniform length, each broken line being about ten inches long.

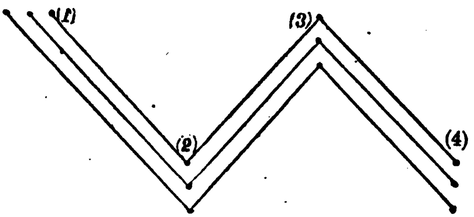
LESSON VII.

BROKEN LINES (CONTINUED).

One, point; *two*, point at the left below; *three*, point at the left above; *four*, point at the left below; *five*, draw from 4 to 3; *six*, draw from 3 to 2; *seven*, from 2 to 1. Add parallel lines by the same signals.



Reverse the process and draw from right to left.

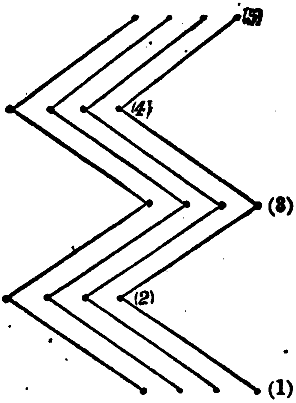


With a little care the children may be trained to repeat in concert *one*, *two*, *three*, etc., as they draw.

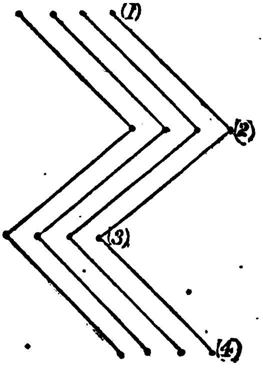
LESSON VIII.

BROKEN LINES (CONTINUED).

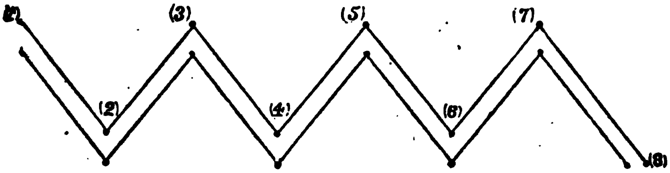
Make the points upward at the signal, and draw downward.



Reverse, making the points downward, and draw upward.



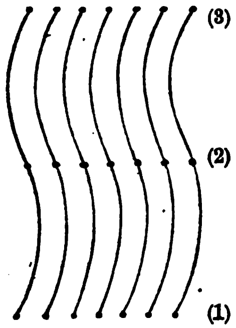
Draw lines from right to left.



LESSON IX.

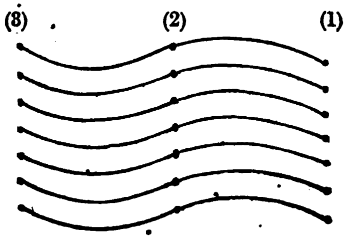
CURVED LINES.

One, point; *two*, point three inches directly above; *three*, point the same distance above; *four*, draw a curve to the left from 3 to 2, and to the right from 2 to 1.



Nothing like accuracy should be expected from the pupils in their first attempts at the above figure.

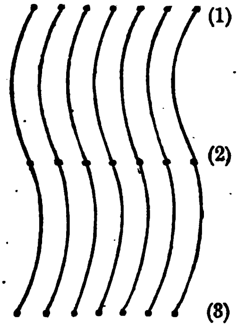
Now point from right to left and draw from left to right.



LESSON X.

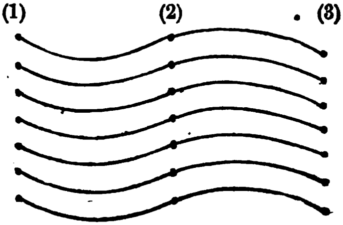
CURVED LINES.

Point downward, and draw the same curve upward.



Compare one of these curves with a straight line and teach the class the difference.

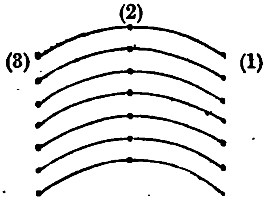
Point from left to right and draw from right to left.



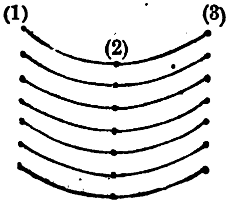
LESSON XI.

CURVES.

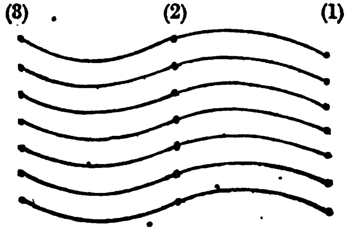
One, point; *two*, point to the left a little above; *three*, point to the left below; *four*, join these points by a regular curve from left to right.



Let point 2 be made below the others and draw from right to left.



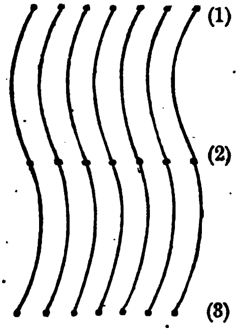
Now point from right to left and draw from left to right.



LESSON X.

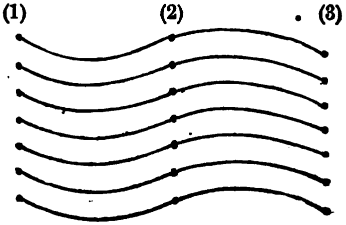
CURVED LINES.

Point downward, and draw the same curve upward.



Compare one of these curves with a straight line and teach the class the difference.

Point from left to right and draw from right to left.



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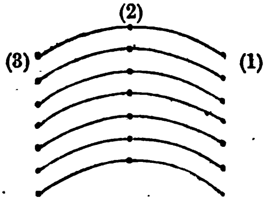

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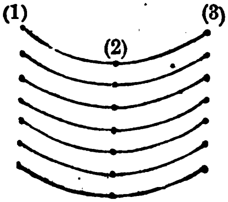
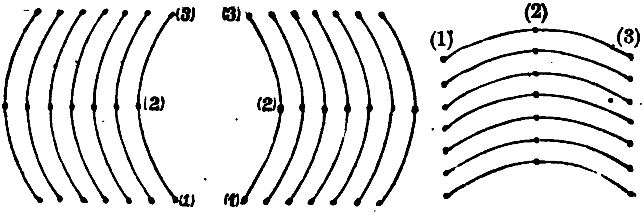


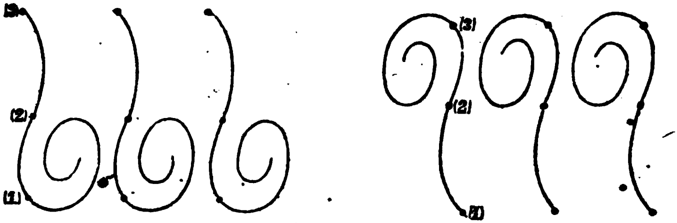
LESSON XII.

CURVES.



LESSON XIII.

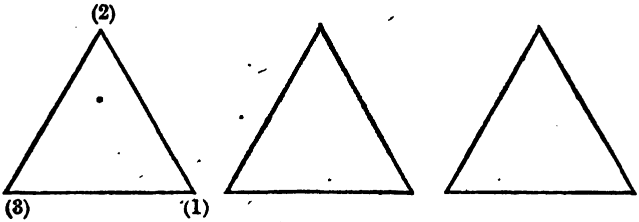
CURVES.



LESSON XIV.

FIGURES.

One, point; *two*, point six inches above at the left; *three*, point six inches below at the left; *four*, draw a straight line from 3 to 2; *five*, from 2 to 1; *six*, from 1 to 3.

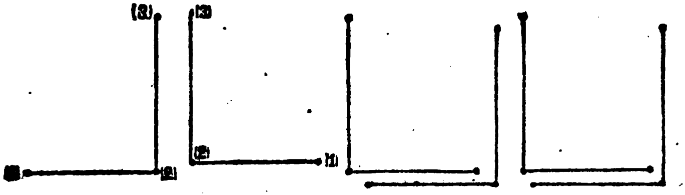


A triangle is a figure having three sides.

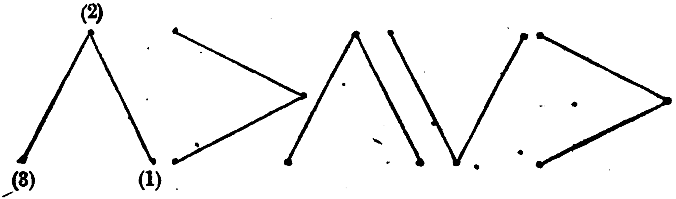
LESSON XV.

ANGLES.

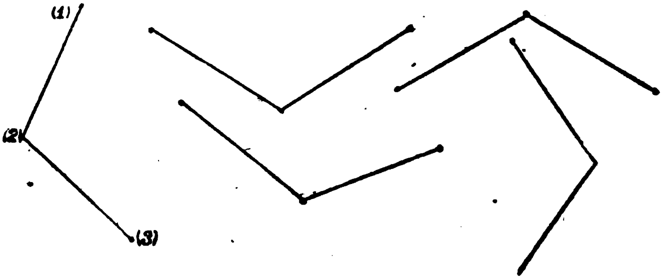
Draw a horizontal line and another line perpendicular to it. In making these lines teach the class what an angle is, viz., that it is the point or corner where two lines meet, and that when one straight line meets another so that the two angles which it makes are equal, the angles are right angles. Make the children familiar, by practice and numerous examples, with the form of a right angle.



An angle less than a right angle is an *acute* angle. Draw many examples.



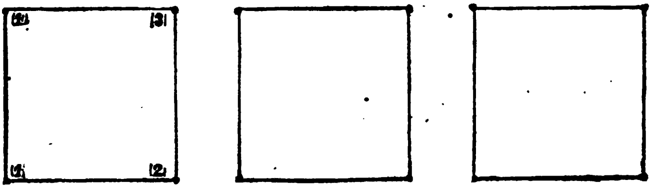
An angle greater than a right angle is an *obtuse* angle.



LESSON XVI.

THE SQUARE.

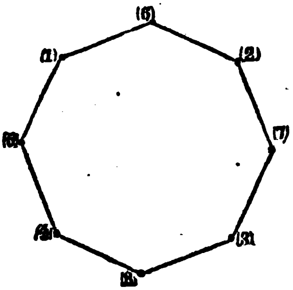
Make four dots as follows, then draw from 4 to 3, 3 to 2, 2 to 1, 1 to 4.

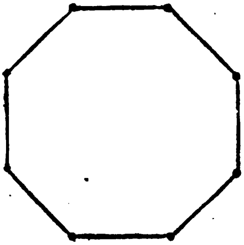


LESSON XVII.

THE OCTAGON.

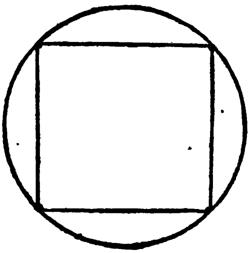
Make four points as in the square, then add four more as in the diagram below; connect the eight points with straight lines.

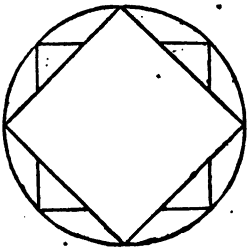




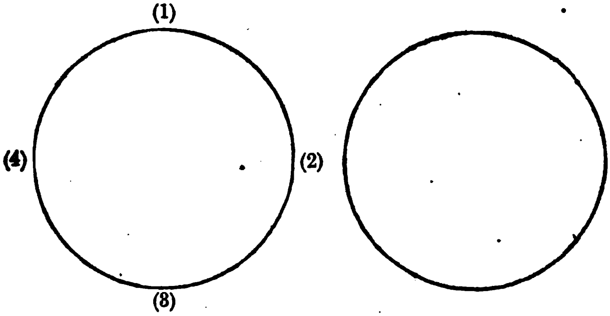
LESSON XVIII.

Make four points and draw a square, then connect the angles of the square with regular curves.





Now arrange four points as follows, and beginning at 1 draw a circle through.



This last lesson is difficult, and the class will need repeated practice in drawing it. Even after many trials, they will not be able to draw anything like a true circle. Indeed, the teacher who expects that his pupils will attain any degree of skill from the foregoing lessons, will be disappointed. The real purpose proposed is to make the various lines to be drawn familiar as objects of sight, and in doing this, to give some little practice to the hand.

THE ALPHABET IN DRAWING LESSONS.

Pupils who have thoroughly practiced the foregoing lessons, are prepared to learn the alphabet by means of drawing. Those of the class,who know it already, may also profitably engage in the same exercises.

The letters may be the more easily taught by this method, because they are composed of the lines which the children have learned to draw.

By actually drawing and naming the parts of a letter, its form and name, *as a whole*, may be easily impressed on the memory.

In this manner the learning of the alphabet, instead of being a spiritless task as it has too often proved, is exceedingly attractive to the child and becomes a valuable aid in cultivating the sense of sight.

In the following lessons the capital letters are so arranged as models, that the pupil begins with the letter which is simplest in form, and gradually progresses to the more difficult. This order is the same as that of the previous drawing lessons.

Thus, I, being composed of perpendicular lines, constitutes the first lesson.

L T F H E being composed of perpendicular and horizontal lines and right angles, are placed next in the series.

K N M Y Z A V W X, being composed

of perpendicular, horizontal, and oblique lines and acute angles, come next in order.

S C G P B D U J R O Q, being composed mainly of curves, come last in order and complete the lessons on capitals.

MODEL METHOD FOR TEACHING THE CAPITAL LETTERS.

LESSON I.

MODEL FOR I.

[*Teacher draws two perpendicular lines, thus:* ||.]

Teacher. We will begin to-day to draw the great letters. What lines have I made?

Children. Two straight lines.

T. Are they perpendicular or horizontal lines?

C. Perpendicular lines.

T. Well, lines that are all the way the same distance from each other are called parallel lines. These two lines are everywhere the same distance apart. What are they called, then?

C. Parallel lines.

T. Now draw these two lines; then join them at the top in this manner: I.

[*Let the class practice the character until they can draw it with some facility.*]

T. You have been drawing one of the great letters. Shall I tell you its name? It is I. Repeat.

C. I, I, I.

LESSON II.

MODEL FOR 𝕃.

Teacher [*Draws two perpendicular lines, as in the foregoing lesson*]. || What lines have I drawn?

Children. Two perpendicular lines.

T. But these lines are all the way the same distance apart. What are such lines called?

C. Parallel lines.

T. Now notice that I draw two more lines, so that they join these perpendicular lines at the bottom and make a right angle; thus, 𝕃. What are these last two lines called?

C. Horizontal lines.

T. And being the same distance apart, what are they also?

C. Parallel lines.

T. And what angles do they make with the two perpendicular lines?

C. Right angles.

T. [*Joins the opening at the extremity of the lines and makes the children draw the character thus obtained until they are familiar with its form.*] This is another great letter. Will you remember if I tell you its name? It is L. Repeat.

[*The children pronounce* L, L, L.]

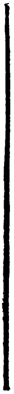
T. What did we draw yesterday?

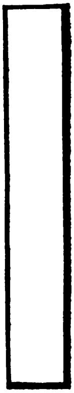
C. I.

[*Teacher draws and reviews the two lessons.*]

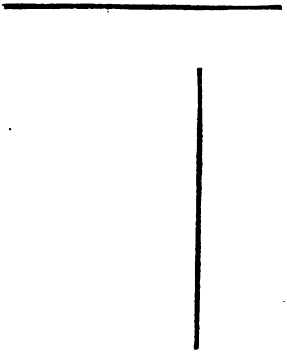
MODELS FOR CAPITAL LETTERS.

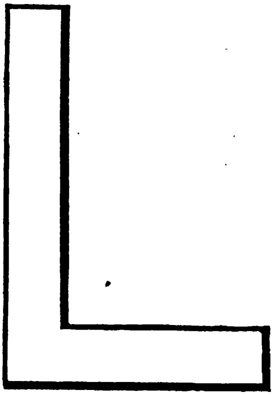
LESSON I.



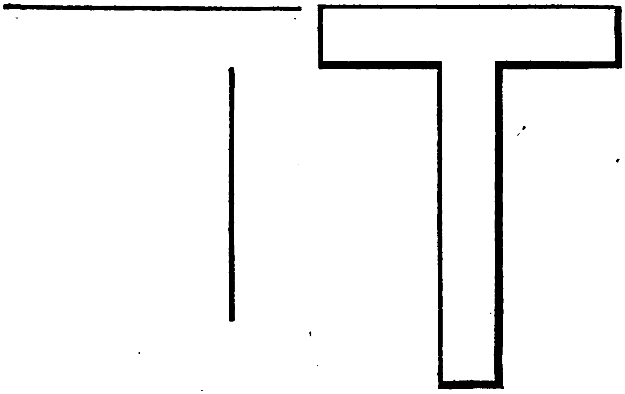


LESSON II.

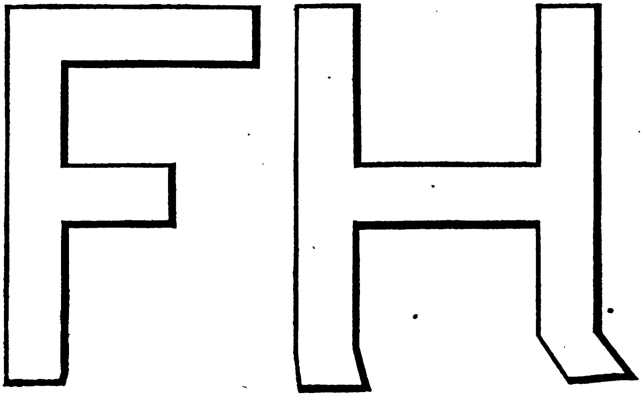




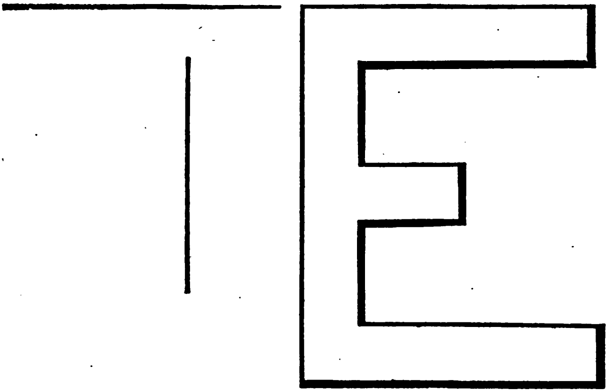
LESSON III.



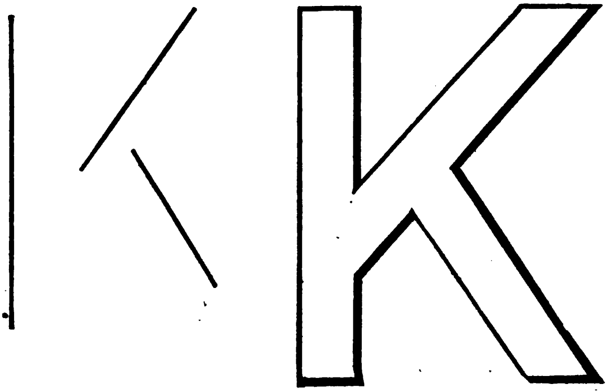
LESSON IV.



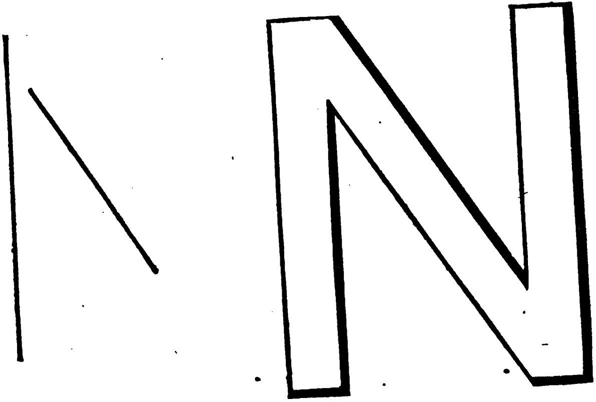
LESSON V.



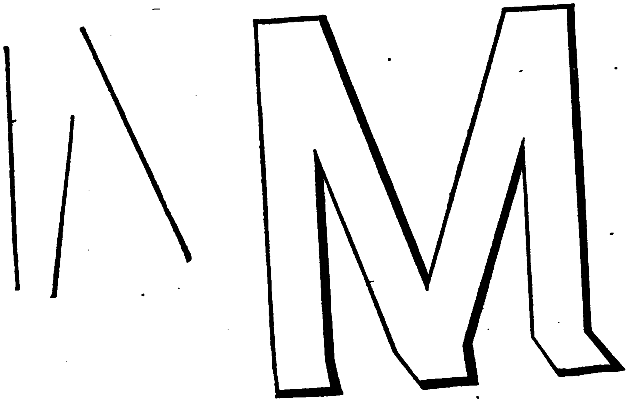
LESSON VI.



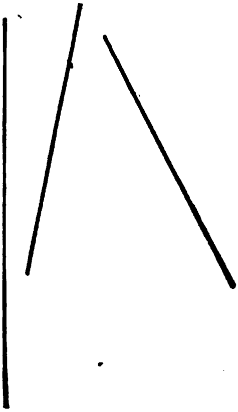
LESSON VII.

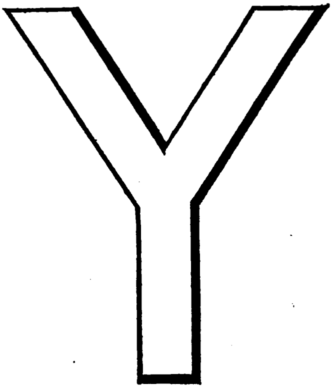


LESSON VIII.

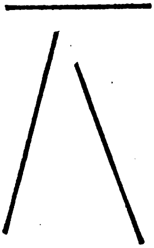


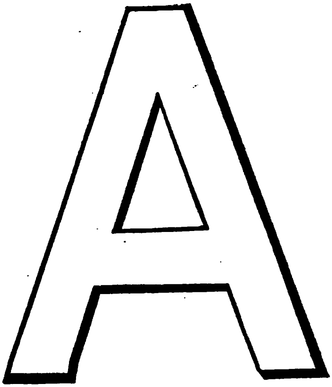
LESSON IX.



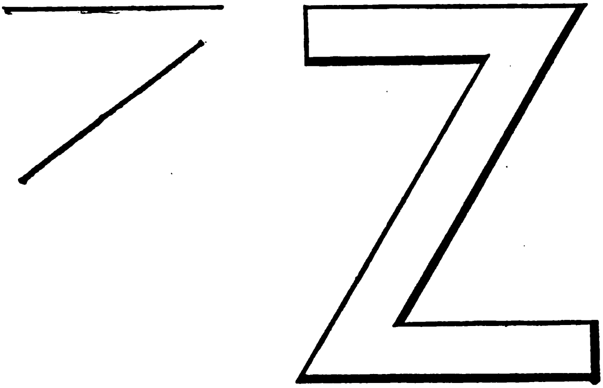


LESSON X.

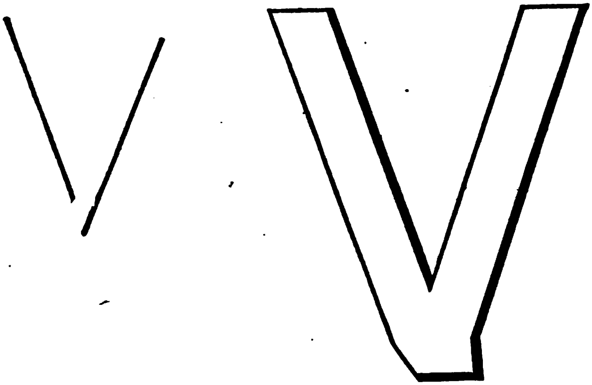




LESSON XI.



LESSON XII.



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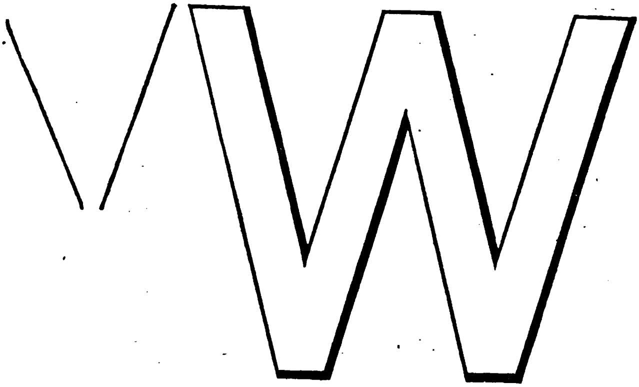
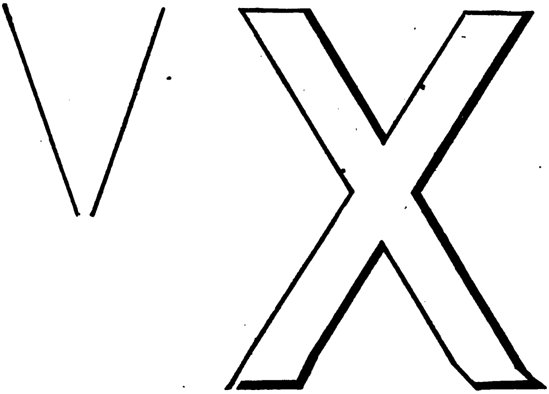
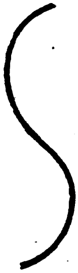
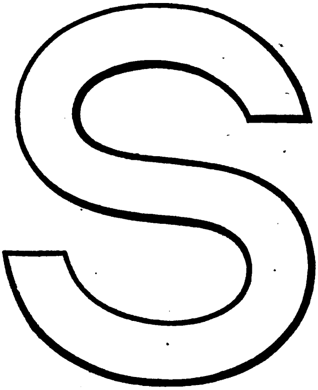


LESSON XIV.

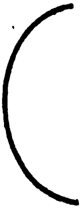


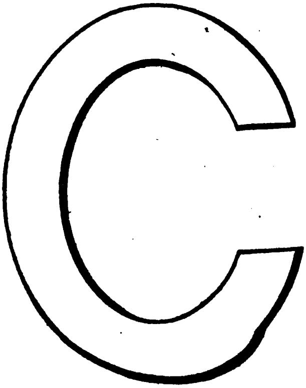
LESSON XV.





LESSON XVI.





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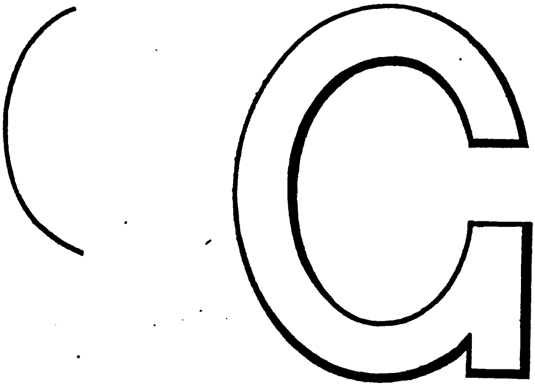

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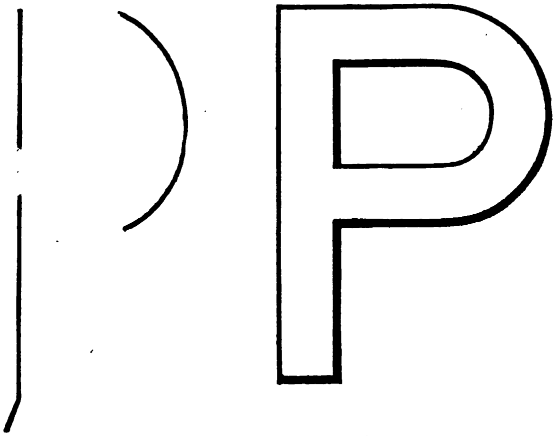

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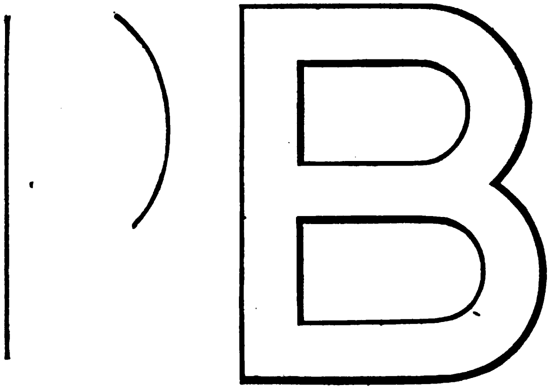

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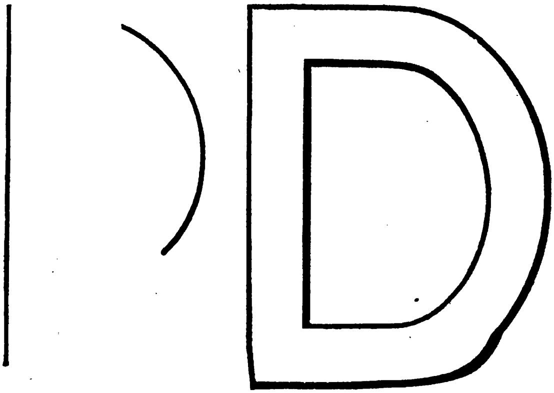

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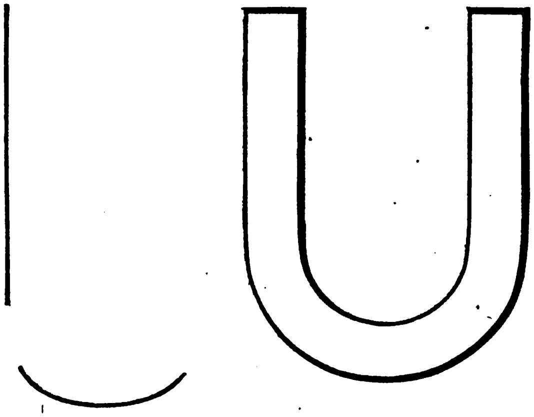

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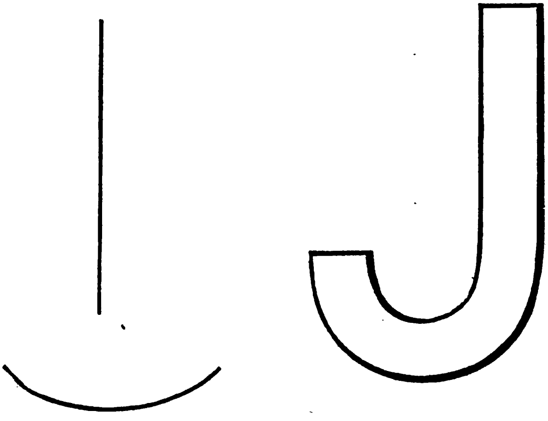

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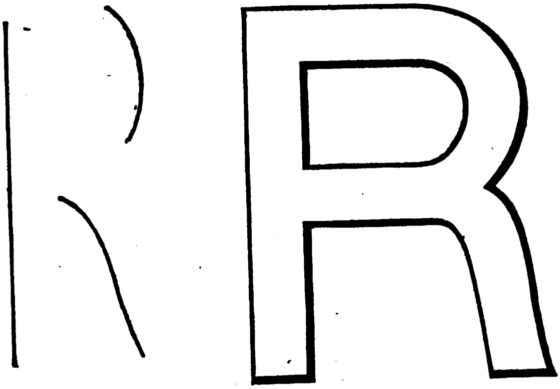

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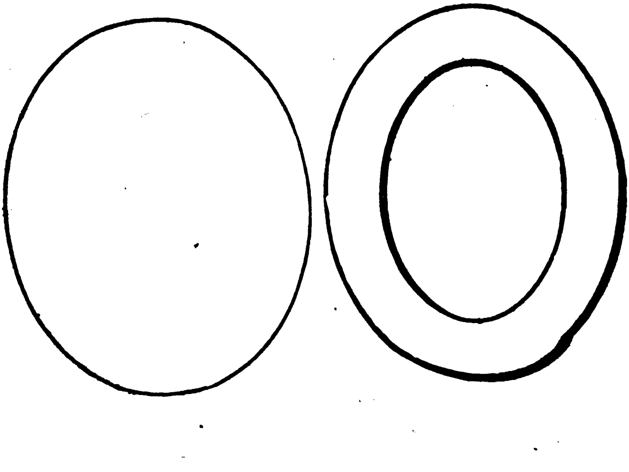
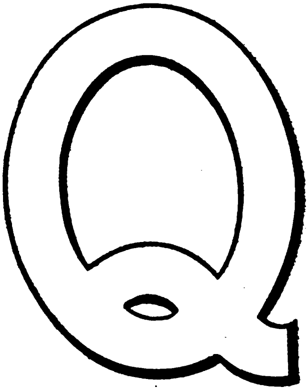




MODEL LESSON FOR THE SMALL LETTERS.

LETTER i̊.

[*Teacher draws two perpendicular lines.*]

Question. What lines have I drawn?

Answer. Two perpendicular lines.

Q. You see they are everywhere the same distance apart. What shall we call them from that fact?

A. Parallel lines.

[*Teacher joins the lines at the top and bottom and makes a small circle over.*]

Q. What have I drawn over this letter?

A. A little circle.

[*The class now draw the character after the model made by the teacher until they can make it readily.*

The teacher then pronounces the name and children repeat.]

The small letters, i, v, w, k, x, o, etc., may be taught in the same manner as the corresponding capitals, but should be drawn smaller.

Let the letters b, d, p, q, be taught consecutively and the form and name of each thoroughly learned before proceeding to the next. Make the children say, without the figure, where, in the case of each letter, they draw the curve. Thus:

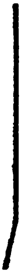
Q. Where is the curve in b?

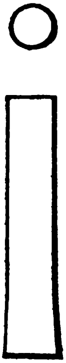
A. On the right side of the straight line, at the bottom.

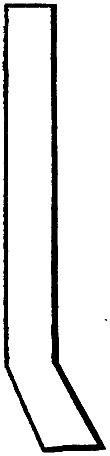
Q. Where is the curve in d?

A. On the left side of the line, at the bottom.

LESSON I.







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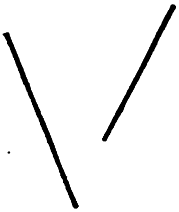

VW

X

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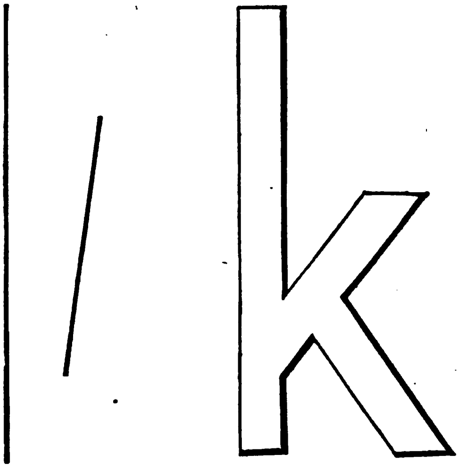

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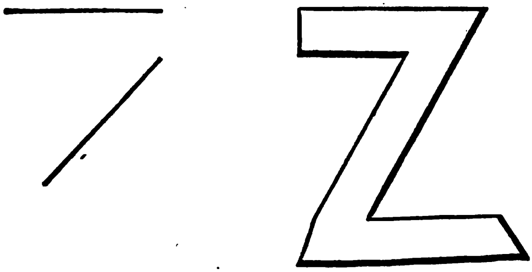

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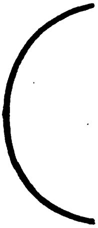

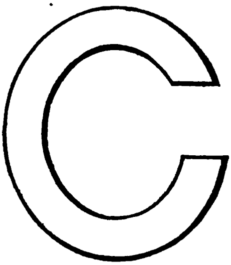

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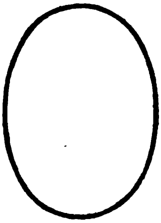

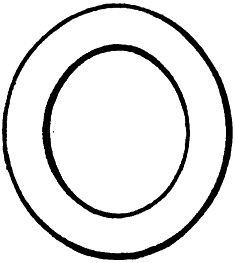

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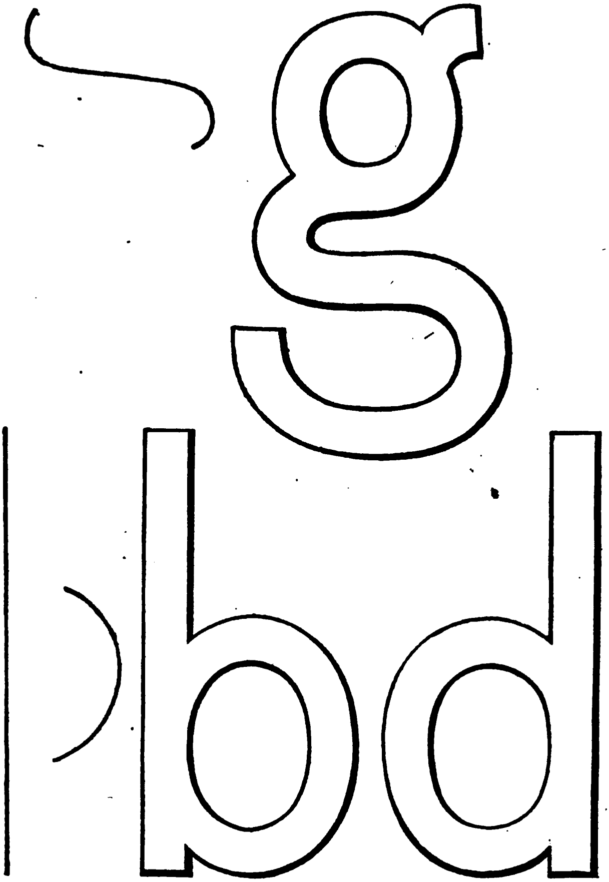

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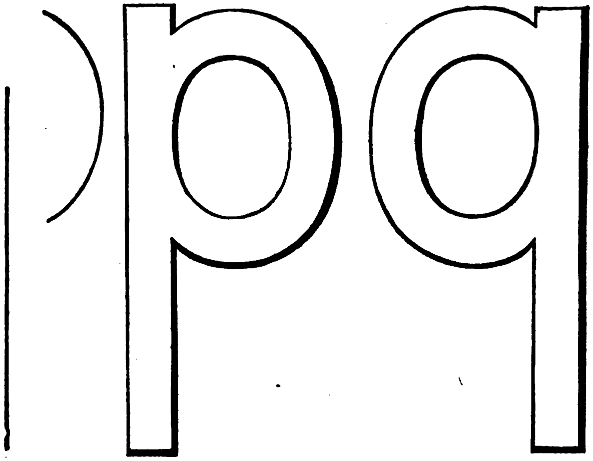

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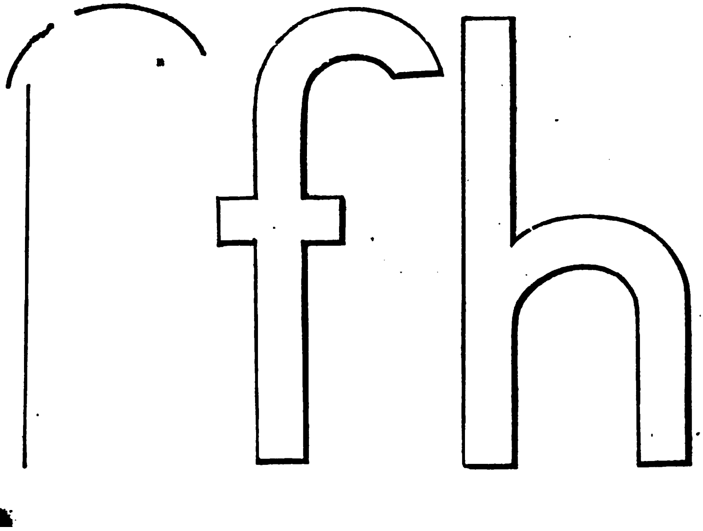

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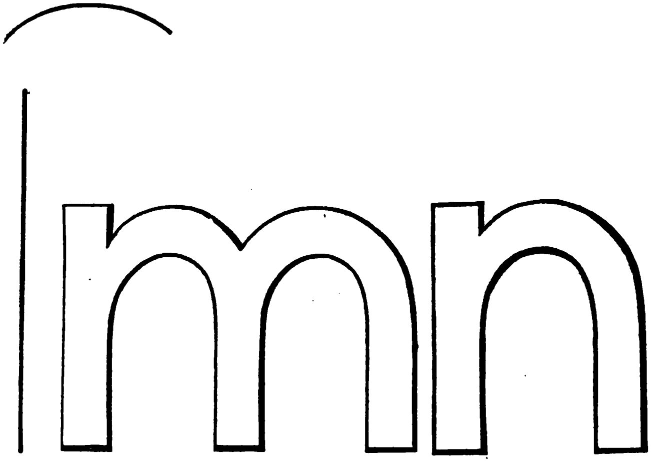

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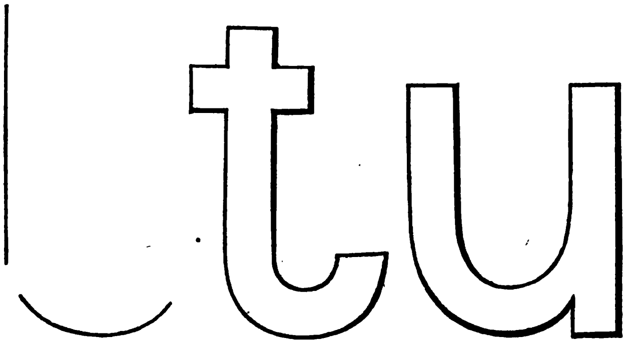

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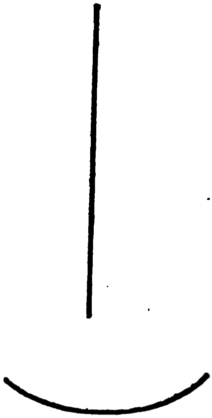

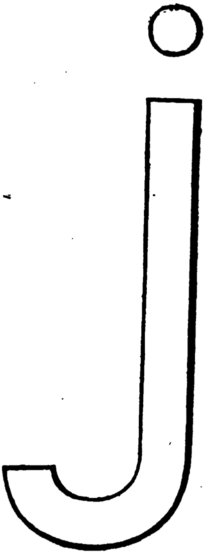

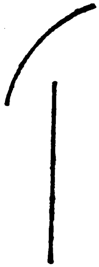

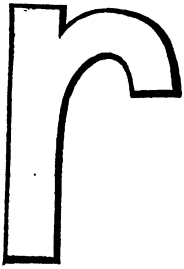

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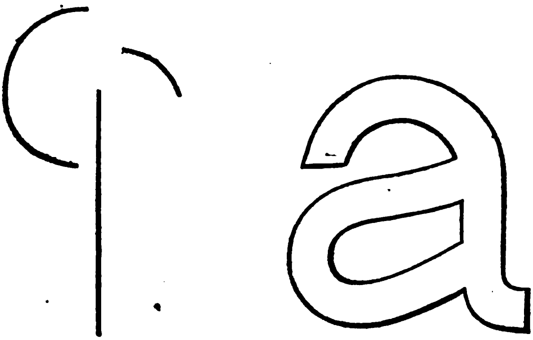

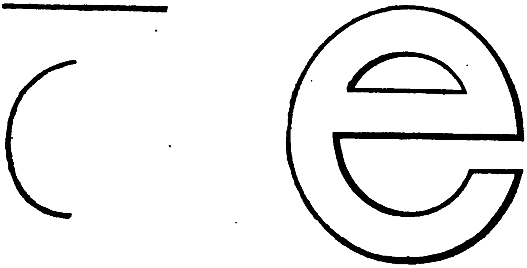

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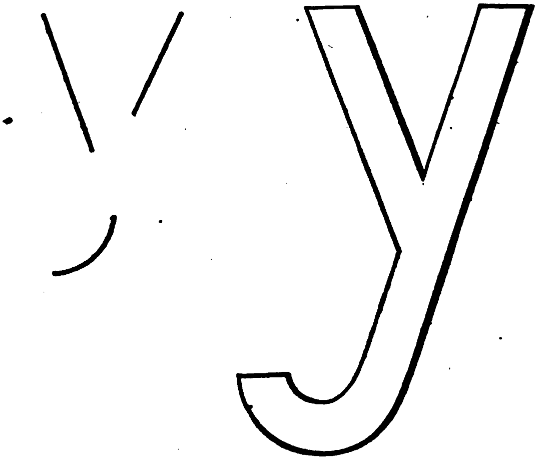
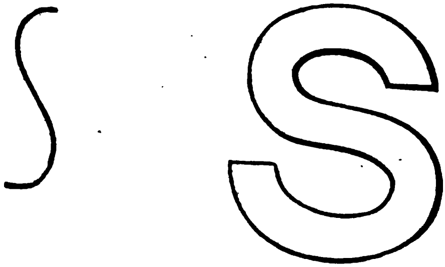




SIGHT AND SOUND SPELLING.

When the children can draw and name all the letters with facility, they may begin to spell short words by printing them on the board.

Just here, spelling by characters and spelling by sounds should be taught together, and the distinction between them so carefully and constantly presented, that the child can not fail to gain a practical knowledge of it.

Sight spelling is writing and naming, in their order, the letters that compose a *written word.*

Sound spelling is uttering separately and combining properly the sounds that compose a *spoken word.*

Sight spelling, being addressed to the eye, should be taught with the pen, pencil, or crayon. The pupil should be required to write the word, instead of merely naming its letters according to the old method.

Sound spelling is addressed to the ear and should be made simply a vocal exercise, the teacher pronouncing the word and the pupil uttering and combining the sounds that compose it.

To beginners, *sight and sound spelling must be taught by imitation and frequent repetition.* As a further preparation for the class, the teacher is urged to have them review several of the last exercises under " Object Lessons on the Mouth."

We shall give here only a few specimen lessons, and the intelligent teacher will be able to extend these lessons much further.

It is desirable to choose for such lessons, words that are familiar to the children and that have significance.

LESSON I.

Teacher. Spell ME.

Class [*spelling by sound*]. ṁ–ē *me.*

T. Now let us print this little word on the board. [*Children print from a copy made by the teacher.*] What letters have we printed?

C. m and e.

T. Well, m stands for ṁ and e (letter) stands for ē (sound), and so m–e [*naming the letters*] spells *me.* Repeat—m–e, *me.*

C. m–e, *me.*

T. This is spelling by letters. Now spell *me* by sounds again.

C. [*spelling by sounds*] ṁ–ē *me.*

T. Again by letters.

C. [*by names of letters*] m–e *me.*

[*In this way exercise the class on* HE, BE, AT, UP, NO, ON, *etc.*]

LESSON II.

Teacher asks for one of the boys' hats and gives a brief object lesson on its kind, color, material, uses, etc.

He then has the pupils spell HAT by sound. He next prints HAT on the board for them to copy, and lastly teaches them to spell it by naming the letters.

In a similar way, such words as:

MAT
RAT
BAT
CAT

PIG
GIG
JIG
RIG

TOP
HOP
MOP
SOP.

Such exercises may be continued until the class can print easily any word of one syllable. The teacher may then teach words of two syllables in the same manner.

LESSONS ON COLORS

For these lessons the teacher will need cards of various colors. At first three or four grades of each color will be sufficient. By attending to the following directions, any teacher can prepare the cards. The materials needed are a few sheets of white pasteboard, a piece of thick window-glass, a table-knife for mixing the colors, a few ounces of white glue, and a few cents' worth of each of the following colors:

Prussian Blue,
Chrome Yellow,
Rose Pink,
American Vermilion,
Dry White Lead.

These can be obtained at any drug store.

Dissolve some of the glue in warm water, say one tablespoonful of glue to a teacupful of water. Put some of the white lead to soak in water enough to cover it.

To prepare the Blue cards, soak some of the Prussian Blue in water. Put a small portion on the window-glass and grind it fine with the knife. Mix a little of the dissolved glue with it. Then, with the table-knife, paint a strip the whole length of the pasteboard and three inches broad. This cut into lengths of four inches will furnish the dark-blue cards

With what remains of this blue color mix a little of the white lead and add a small quantity of the dissolved glue. Paint another strip of pasteboard with this. It will form a set of cards lighter in shade.

In this manner the blue may be reduced till it becomes a gray, though perhaps three or four shades will be sufficient.

The same process with the Vermilion will give red cards; with the Chrome Yellow, yellow cards.

Chrome Yellow and Blue will form a Green; Chrome Yellow and Vermilion, an Orange; Rose Pink and Blue, a Purple; from which various shades may be obtained by the addition of white.

LESSON I.

BLUE.

A pine board or a board covered with some cloth must be hung against the wall. Let the blue cards be fastened with pins from top to bottom on one side. The teacher places the darkest card in the center of the board.

Question. What is the color of this card?

Answer. Blue.

Q. Now, William, you may choose a card just like this and fasten them side by side. Has William taken the right card?

A. No, sir.

Q. What is wrong?

A. It is too light.

[*Another pupil corrects it.*]

Q. Has Jane matched it?

The teacher must decide if the class vary greatly in their answers, as will probably be the case at first. Before dismissing they are told to notice and remember all the blue things they see before the next lesson.

LESSON II.

BLUE (CONTINUED).

The teacher calls the attention of the children to the cards on the side of the board, showing them that some are lighter than others. Placing the dark card in the center, as before, he calls on some one to place the next lighter below, the rest of the class deciding whether it is right or wrong. In this manner a regular gradation from dark-blue to gray will be formed. Names should be given to the colors as far as possible; thus, dark-blue, sky-blue, etc.

The class now name any objects resembling the cards in color, which they have noticed. As a further exercise, they may bring to the next recitation anything they can find to match the dark-blue card.

LESSON III.

BLUE (CONTINUED).

Question. How many have found anything to match the dark card? Well, Jane, what have you?

Answer. A piece of cloth.

Jane holds it up and the pupils tell whether she is right or not. If they are unable to decide, place the cloth beside the card.

The lightest card may now be placed in the center, the pupils adding the next darkest until the dark-blue is reached.

The class name all the blue objects in the room.

LESSON IV.

RED.

The red cards being arranged in a column on the side of the board, place the darkest one in the center.

Question. What is the name of this color?

Answer. Red.

Q. Is it dark red or light red?

A. Dark red.

Q. Can you see anything in the room like it?

A. Jane's dress.

Q. Is it darker or lighter than Jane's dress?

A. Darker.

[*William selects a card from the side of the board to match that in the center and pins them side by side.*]

Q. Has William chosen the right card?

A. No, it is too light.

[*Mary selects a card.*]

Q. Is Mary right?

A. Yes.

John selects the card next lighter, and so on through the series. The process is then reversed from the lightest card to the darkest. The pupils then name all the red things they can think of.

LESSON V.

YELLOW.

The yellow cards are arranged on the board in the same manner as the red and blue.

Question. What flower has the same color as this card?

Answer. The buttercup.

Q. What is the name of this color?

A. Yellow.

[*Jane matches the card. The class may be drilled to call* Right, Too dark, Too light.]

Class. Right.

[*Lydia pins on the next lightest.*]

Class. Too light.

[*Susan corrects it.*]

Class. Right.

Q. What has the same color as this card?

A. Cream.

Q. Then what name can we give to this color?

A. Cream-color.

Q. What has the same color as this?

A. A lemon.

Q. What is the name of this color?

A. Lemon-color.

Proceed in this manner, giving as far as possible names to all the colors. Let the class name all the yellow things they can think of.

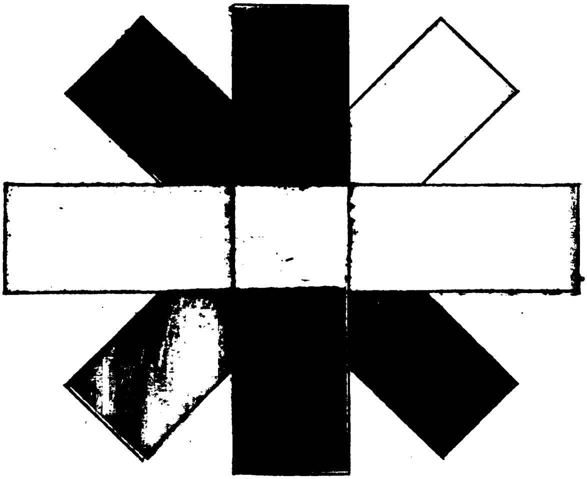
LESSON VI.

SECONDARY COLORS.—I. GREEN.

PATTERN MAKING.

Place a green card between a blue and a yellow one. Tell the class that green is formed by mixing yellow and blue. Colors formed by the mixing of two primary colors, are called secondary colors. Cards arranged in the manner directed, form a pattern which the pupils imitate, first with cards of the same shade, then with those a shade lighter, and so on through the series.

Patterns may be made of several cards of each kind, thus:



Again, pin a blue card and a yellow one a little distance apart, asking the pupils, after proper instruction, to supply the connecting card.

Question. What color is this?

Answer. Green.

Q. What colors is it made of?

A. Blue and yellow.

Q. What green things can you name?

A. Grass is green. The leaves are green. The blinds are green.

Q. Are all leaves the same green?

A. No; some are light, some are dark.

Q. Which is darker, the maple leaf or the willow leaf?

A. The maple leaf.

LESSON VII.

SECONDARY COLORS.—II. ORANGE.

Cards arranged thus: Yellow—Orange—Red.

Question. What fruit is this card colored like?

Answer. An orange.

[*Tell the class that the color is composed of yellow and red and is called orange color.*]

Q. What two colors make Orange?

A. Yellow and Red.

Q. What things can you name that have orange color?

A. Marigold, Tiger Lily, Squash Flower, etc.

[*William raises his hand.*]

Q. What is it, William?

A. The sun has an orange color sometimes.

Exercise the class in pattern making as before.

LESSON VIII.

SECONDARY COLORS.—III. PURPLE.

Purple is composed of Red and Blue. The pupils should form gradations from dark to light and from light to dark, as in the preceding lessons. They should have frequent exercises in imitating a variety of patterns. By such a course they will soon learn that some colors look better together than others—*i. e.*, they harmonize. Strong contrasts of colors should be avoided. These lessons may be extended to the Browns, Drabs, Grays, etc.

of shades of brown and yellow may be found in the dead leaves.

Numerous examples of green, yellow, red, and russet may be pleasantly shown in the fruits of autumn.

At all seasons, the kinds of bark from different trees will supply specimen varieties of neutral colors, especially browns and grays. The pieces of bark may be cut into rough squares two inches across and fastened in columns with small nails.

In the different kinds of wood, also, will be found attractive samples of wood colors. The oaks, red, white, and black; the yellow and white pines; the maple, hickory, black-walnut, butternut, cherry, and a host of other trees will furnish beautiful specimens for the teacher's cabinet.

The pieces of wood may be cut into blocks half an inch thick and two inches square, so that they can be fastened with nails side by side. Teach the children the names of the different samples.

Fragments of rock and the common stones which one finds by the roadside and in the fields,may likewise be made available in this cabinet. Limestone, granite, slate, and many other rocks exhibit a large range of grays, browns, etc. Even if the teacher can not classify the rocks referred to, he will find them valuable aids in teaching children to distinguish colors.

In using the above objects for the purpose above *named, the* teacher will find it often difficult and sometimes impossible to give exact names to the colors which they present. The hues and shades of nature are innumerable, while the words used to designate them are very limited and, in many cases, not very exact. But by careful attention the teacher will, in nearly all cases, find terms as correct as the language affords. He will find, moreover, that his own discrimination in colors is greatly improved by these efforts.

Not much help in this matter can be given from a book, but the following list of colors defined may be profitably referred to:

BLUE—one of the primary colors.
    Marine—a blue, the color of the sea.
    Ultramarine—a very deep blue.
    Prussian—a deep blue with a tinge of green.
    Indigo—a deep blue with tinge of purple. (A specimen should be exhibited.)
    Sky-blue—the blue of the sky.
RED—a primary color.
    Carmine—a pure deep red.
    Rose—a light carmine red.
    Scarlet—a bright red with a yellow tinge.
    Flesh-color—a light scarlet.
    Crimson—pure red tinged with blue.
    Pink—a light crimson.
    Orange-red—a red with a tinge of orange.
    Blood-red—the color of blood.
YELLOW—a primary color.
    Chrome—a rich bright yellow.

Canary—color of the canary, a light chrome.

Straw—color of straw, a pure light yellow.

Lemon—color of lemon, a yellow with tinge of green.

Primrose—color of primrose, a still lighter yellow.

Saffron—color of saffron, a deep yellow with a tinge of red.

Sulphur—color of sulphur, a yellow with a blue tinge.

GREEN—a secondary color, composed of blue and yellow. When the blue predominates we have dark green; when the yellow predominates we have light green. Equal parts of blue and yellow make pure grass green.

Olive—color of the olive, a shade of yellow green.

Pea—color of the pea, a light green.

Tea—color of the plant, a lighter hue of olive green.

Emerald—color of the emerald stone, a rich light green.

Invisible—a black with a green tinge.

PURPLE—a secondary color, composed of blue and red. In dark purples the blue predominates; in light purples, the red.

Royal—pure purple, a mixture of equal parts of blue and red.

Lilac—color of the lilac blossom, royal purple tinted with white.

Violet—color of the blossom, in which the blue predominates.

Lavender—lighter than violet.

Peach-blossom—color of the blossom, a light purple with a reddish tinge.

Orange—a secondary color, composed of yellow and red. In dark or red orange the red predominates; in light or yellow orange the yellow predominates.

Buff—a yellow orange.

Cream—the color of cream, a yellow orange tinted with white.

Salmon—a red orange slightly tinted with white.

Auburn—a dark red orange.

Gray—a secondary color, composed of white and black or of blue, yellow, and red. When a mixture of the last three, it may be called a tertiary color.

Pearl—a very light gray.

Slate—color of the stone, darker than pearl.

Iron—a very dark gray.

Brown—a tertiary color, composed of red, yellow, and blue. In dark brown the blue predominates; in deep brown, the red; in light brown, the yellow.

Chocolate—the color of chocolate, a dark red brown.

Gold—the color of gold, a yellowish brown.

Snuff—a dull, yellow brown.

Maroon—a deep brown tinged with purple.
Drab—a brown tinted with white.
Umber—a yellowish brown.
Tan-color—a deep brown tinted with white.

SPECIMEN LESSONS WITH RED FLOWERS.

LESSON I.

Here is a beautiful bouquet which I have brought for you. Can you name the flowers in it? What are these fine large flowers that are so regular in shape? Dahlias. And what are these small flowers that grow in bunches or clusters? Verbenas. And these little flowers with scalloped edges? Pinks. What is that flower that is shaped like a bell? Morning glory. Yes; and here are several roses; and here, too, is a geranium.

Now what is the color of these beautiful flowers? They are all red. But are they all the same kind of red? No, sir; different kinds. We will try to sort out and name the different kinds. What did you tell me is the name of this flower? It is a dahlia. Well, find among the red cards one most like it in color. (James) Here it is. Very well, James, what is the color of the dahlia, then? Dark red. Is there any other flower here which has the *same* shade of red? No, sir. Which has the *nearest shade?* *That* rose. Is the rose lighter or darker?

Lighter. Well, now think of other things which the dahlia is like in shade. It is like a brick. Bricks have different shades of red. Bring me one to-morrow and we will see. Have we no stones here that have the same shade? Yes, sir; here is a pebble with the same shade. Not quite; is it darker or lighter? Darker.

LESSON II.

THE BOUQUET (CONTINUED).

Here is a cluster of red geranium blossoms; are they bright or dull? Very bright. Here is a blue card and a yellow one; which are they most like? The yellow one. Very well; a bright red with a tinge of yellow is *scarlet*. What will you call these flowers, then? *Scarlet*. What things can you think of that have the same shade? My little sister has a scarlet dress. Are there any other flowers here that have the same shade? Yes, this cluster of verbenas. Are *they* lighter or darker? A little lighter. What shall we call the shade of the verbenas, then? Light scarlet. Here is an aster which is a still lighter scarlet. Now a very light scarlet is called *flesh-color*. What color is the aster, then? Flesh-color.

Look now at another aster. You see it has a beautiful color, but the shade is quite unlike the *scarlet* geranium. Compare it with a blue and a yellow card, and which is it more like? A little more like the blue. Well, a pure red like this, with a slight tinge of blue, is called *crimson.* Have we any other flowers with a similar hue? Yes, the pinks, but they are lighter. Well, the pink, then, is a light crimson, and a light crimson is called *pink color.* What, then, is the color of the pink? Pink color.

Here is a verbena cluster which is deeper. Now a deep red is called *carmine.* What is this verbena called, then? Carmine. The color of this rose is *carmine,* but is lighter than the verbena. A light carmine is called a *rose-color.* What is the color of the rose? Rose-color.

LESSON III.

Review Lesson I. and II. by requiring the class to name accurately each variety of red found in the bouquet.

LESSON IV.

Materials.—A bouquet of yellow flowers, some bright straw, a few pieces of yellow wood, a lemon, a piece of sulphur, and a little chrome yellow.

Here is an article sold at the drug stores. It is *sometimes* mixed with oil to make yellow paint.

You see it is a bright yellow. It is called *chrome yellow*. Now see if there are any flowers that have a chrome yellow color. Yes, here is one, but it is lighter, and a light chrome is called *canary*, the color of the canary bird.

Look at this straw; you see it is a light yellow; it is called *straw-color*. Find a card like it. Think of anything else that is straw-colored. This primrose is lighter yellow and the color is called *primrose*. Are there any more flowers like it? Are they darker or lighter?

Now select a piece of wood that is nearest like *straw*. Is it darker or lighter? Is there a piece colored like the primrose? Select the one nearest to it. Is it darker or lighter?

Here is a lemon; look at it carefully. Don't you see a slight tinge of green on it? Well, a yellow tinged with green is called *lemon-color*. Are there any flowers or pieces of wood colored like the lemon? etc., etc.

LESSON V.

Review by having the class name the objects in the lesson, together with their colors.

In this manner the teacher may continue these exercises until he has embraced varieties of all the colors. By frequent reviews the class will soon select and name any variety with great readiness.

LESSONS ON LENGTH.

LESSON I.

THE FOOT.

Look at this rule all of you; it is a foot long and is called a foot rule; anything just as long as this rule is a foot long; anything twice as long is two feet long; anything three times as long is three feet long. Now see me measure this stick. [*The teacher is provided with half a dozen straight sticks, one, two, three, four, five, and six feet long respectively.*] How long is it? *Ans.* One foot long. We will measure another. One, two. How long is this? *Ans.* Two feet long. Now another. Count while I measure. One, two, three. How long is it, then? *Ans.* Three feet long.

Thomas, come here and measure one carefully. The rest count for him. One, two, three, four. How long? *Ans.* Four feet long. Let me measure the other two. How long is this? *Ans.* Five feet. And this? *Ans.* Six feet.

So you see these sticks have six different lengths. I will mix them all together. Now, John, find the one that is a foot long. Right. William, pick out the one three feet long. Is that the right one, class? *Ans.* No, sir; that is four feet long. [*William tries again.*] Is that right? *Ans.* Yes, sir.

Let the class practice in this way till they can *select readily* any measure called for.

LESSON II.

THE FOOT.

[*The answers of the class are in italics.*]

Thomas, you may lay all the sticks on the table, the shortest first, the next a foot longer, and the next a foot longer still, until you get to the longest. The rest may watch him and call the length of each as he lays it down. *One foot long. Two feet long. Three feet long. Five feet long.* Wrong, Thomas; choose again. *Four feet long. Five feet. Six feet.*

We will next measure something else. Guess the length of this table the long way. *Four feet.* William, take the rule and measure it carefully. One, two, three, and a half again: how long? *Three feet and a half.* How long is the table the short way? *Two feet.* I will measure. One, two, and a half again: how long? *Two feet and a half.* Listen; the long way of the table is its *length* and the short way is its *width.* How long is the table this way? *Three feet and a half.* And how wide is it? *Two feet and a half wide.* Here is a piece of board; which way is its length? *That way.* And its width? *This way.* Guess how long it is. *Five feet long.* Not quite; it measures one, two, three, four, and a half again: how long? *Four feet and a half.* Now tell me which way is the length of this door? *Up and down.* Which way is its width? *Across this way.*

Exercise the class in this manner, measuring the various objects in the room. The children may guess each other's length, each case being settled by the foot rule.

LESSON III.

THE FOOT.—HIGHT.

Where is the bottom of the door? *Where it touches the floor.* Where is the top of it? *That part farthest up.* Well, which way is the length of the door? *From the bottom to the top.* Yes, and this is called its hight. The length of anything upward from where we stand is its hight? What is the hight of the door, then? *Its length from the bottom to the top.* Guess how many feet high it is. James. *Five feet.* Susan. *Six feet.* Let us measure. It is seven feet high. How wide is the door? *About three feet.* Yes, exactly three feet wide.

In this manner teach the hight and width of a window, the hight of the ceiling, or anything else in the room that has hight.

LESSON IV.

THE INCH.

Here is still another foot rule; you notice it is wider than the one I first showed you. Look, I have *divided it* with these lines of ink into equal parts.

How many of these equal parts are there? Count and see. *One, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve.* How many of these equal parts are there in the foot rule, then? *Twelve.* Well, one of these parts is an inch and, as we have twelve of them in the rule, how many inches make a foot? *Twelve inches.* Repeat together—"Twelve inches make one foot."

Look at this foot rule carefully a moment before I put it out of sight. Now all go to the board and try to draw a horizontal line just a foot long. [*Measuring the lines thus drawn.*] You see they are all too long or too short except William's, which has just the right length. Here, William, is a bit of straight stick; you see by placing it on the foot rule that it is just as long as one of the twelve parts. How long is it, then? *An inch long.* How long would twelve such sticks be if placed in a line? *A foot long.*

I will show you how to divide a foot line on the board into inches. [*Draws a horizontal line a foot long and divides it with his inch measure into twelve parts, marking the inches with short perpendicular lines.*]

William, you may try to divide your line into inches in the same way. Pretty well. Who else will try?

[*The teacher is further provided with twelve straight sticks, such as can be easily* cut from a tree *or shrub. Each of these sticks* represent in length a *different number of inches, from one to twelve inclusive.*]

You see I have mixed these sticks together and set them up where you can all see them. When I tell any one of you to pick out a stick of the length I shall mention, the rest may call out *Right!* or *Wrong!* as the case may be. Susan, find the stick which is one inch long. *Right.* John, show me the stick that is three inches long. *Right.* Thomas, which is the five-inch stick? *This one.* *Wrong.* How long is it, class? *Four inches.* Choose again, Thomas. *Right.* William, which is the six-inch stick? *Right.* You see the foot rule is just twice the length of William's stick; what part of a foot is six inches, then? *Half a foot.*

The teacher may now measure the fingers of the children with the inch measure.

He may also here teach the distinctions of length, breadth, and thickness by measuring books, slates, a brick, etc., etc.

LESSON V.

THE YARD.

Look among the long sticks for the one that is three feet long. *Here it is.* Well, anything that is three feet long, is one yard long; how long, then, is this stick? *One yard long.* And how many feet make a yard? *Three.* Repeat, then—"Three feet make one yard."

A stick like this, three feet long, is used sometimes to measure cloth, calico, ribbons, and such things, and is called a yard-stick. Apply it to the six-feet stick. *Two yards.*

James, Henry, and Jane, look at the yard-stick; then go to the board and draw a horizontal line a yard long. James' line is a little too long; the others' are too short. I will make them right. Now divide these lines into three equal parts. Pretty nearly right. I will make them exact. Now, William, take the inch measure and divide one of these parts into inches. All repeat—

"Twelve inches make one foot."
"Three feet make one yard."

The teacher now measures with his yard-stick the length of various objects, such as the floor, the recitation bench, the outside of the school-house.

LESSON VI.

THE ROD AND THE FURLONG.

The teacher is furnished with a pole a rod in length. This pole is divided by notches into five and a half yards. The entire yard at one end of the pole, is divided into feet and the extreme foot of this yard is cut into inches.

By a process similar to that of the previous lesson, he teaches the class that "Five and a half yards make a rod." Having given a clear conception of *the length of* the rod, he takes the class into the field and asks them to guess at different distances, three, five, six, nine, or twelve rods in extent and limited by some visible object, as a tree or a rock.

Finally, accompanied by the children he measures off forty rods of level road, stations a boy at one end and another at the other end of the space measured, places the children where they can see both boys, and thus gives the notion of a furlong and the number of rods that it contains.

With these data he can easily give an idea of the length of a mile.

These lessons should be closed by a concert recitation of the table of distances:

Twelve inches make one foot;
Three feet make one yard;
Five and a half yards make one rod;
Forty rods make one furlong;
Eight furlongs make one mile.

The preceding lessons on length will suggest to the teacher the proper method of teaching the scale of weights.

He will need for this purpose a pair of scales and the different weights.

With the same method he may also teach the scales of the different measures, as dry measure, wine measure, etc. The apparatus for such exercises can be easily obtained.

Each series of lessons should be followed by a *concert recitation* of the entire corresponding table.

GEOMETRICAL FIGURES IN DRAWING LESSONS.

No exercise is more effective in cultivating the sense of sight, than that of drawing the various figures in Geometry. These figures, moreover, serve as excellent models for manual practice. In drawing them and afterward pointing out and naming their different parts, both the eye and the hand of the pupil are equally trained to precision and quickness.

So great is the value of these lessons that the teacher who is unskilled in drawing, is earnestly urged to prepare for teaching them by special practice.

By spending a half hour of leisure in drawing each figure, he will find, in nearly all cases, that when the time allotted to the lesson arrives, he can draw a model sufficiently correct for the children to imitate. Aside from the progress of the class, his own improvement will amply repay him for such an effort.

In the following exercises in drawing we can profitably review a few of the lessons already given.

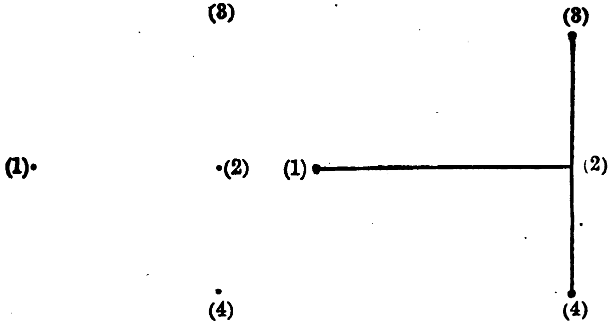
LESSON I.

THE RIGHT ANGLE.

(FOR THE BLACKBOARD.)

Please follow the method used in giving our first *lessons in drawing*.

At the word *one* make a point; at the word *two* make a point six inches to the right; at the word *three* make a point three inches directly above the last; at the word *four* make a point three inches below, thus:

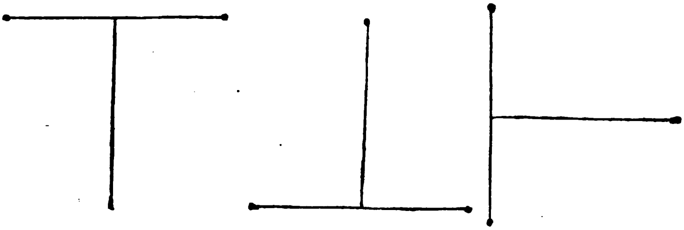


Now begin back at the first point and connect the points in the same order as I count *one*, *two*, *three.*

What kind of lines have we drawn? *Two straight lines.* In what respect are they different from each other! *One is a horizontal and the other a perpendicular line.* What are these two openings made by one line meeting the other called? *Angles.*

But do you remember when one straight line meets another straight line, so that the angles which it makes are equal to each other, what these angles are called? *Yes, sir; they are called right angles.* Repeat—"When one straight line meets another *straight* line in such a way that the angles which it makes are equal to each other, these angles are right angles."

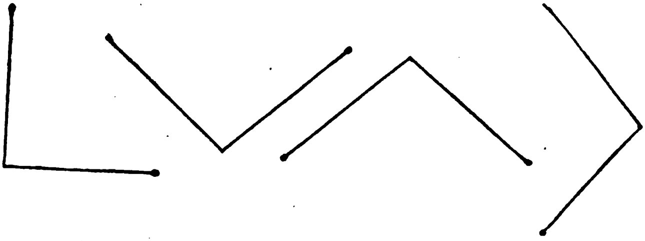
Draw the same angles in different positions, as follows, and point out the two right angles.



Next make several right angles in a variety of positions and let the class draw them, until they can at once distinguish a right angle whenever they see one.

LESSON II.

OBTUSE ANGLES.



Make one right angle and then three obtuse angles. Let the class practice drawing these a while. Then:

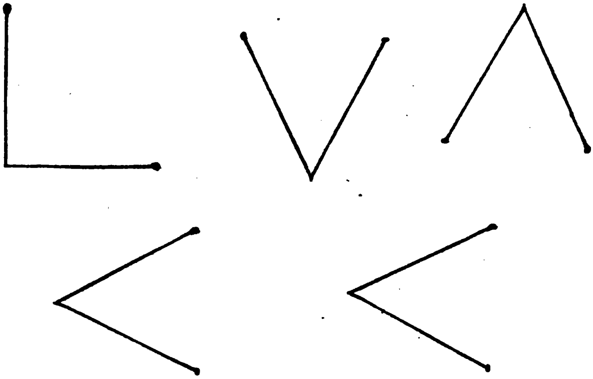
How many angles have we drawn? *Four.* Which of these is a right angle? *The first one.* Are the other three larger or smaller than the right angle? *Larger.* Well, any angle larger than a right angle is called an *obtuse angle.* What, then, are these three angles? *Obtuse angles.*

I will rub out your models. Clean the board and draw a right angle. [*The class draw.*] Now draw four obtuse angles.

LESSON III.

ACUTE ANGLES.

Draw a right angle and four acute angles for models.



After sufficient practice in drawing these, let the *children point* out the right angle. Then:

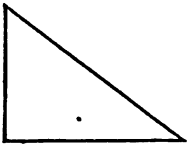
Are the other angles you have drawn greater or less than the right angle? *Less.* All angles less than a right angle are called *acute angles.* What are these angles, then? *Acute angles.*

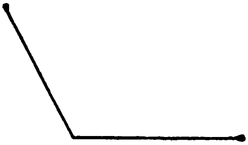
Now clear the board of models and all draw one right angle and four acute angles without a copy.

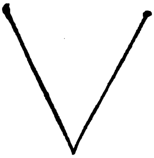
LESSON IV.

TRIANGLES.—THE RIGHT ANGLE.

Let the class make three angles without a model, viz., a right angle, an obtuse angle, and an acute angle, and give the proper name to each.







Next all join the ends of the lines in the right angle with a straight line.

Now do you remember the figure that you have made, James? *Yes, sir; it is a triangle.* How many lines or sides has it? *Three.*

How many angles has it? *Three angles.* What is a triangle, then? *A figure that has three sides and three angles.* Repeat.

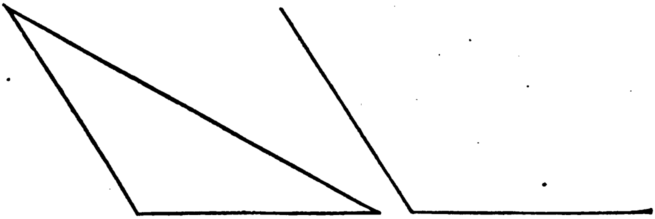
Look again at our triangle and tell me how many *right angles* you can find in it. *One.* What kind of angles are the two others? *Acute angles.* Well, every triangle with a right angle in it, is a right angled triangle. Repeat—*Every triangle*, etc.

Each draw without a model several right angled triangles.

LESSON V.

OBTUSE AND ACUTE ANGLED TRIANGLES.

Draw an obtuse angle. Right. Now connect the ends of the two lines with a straight line.

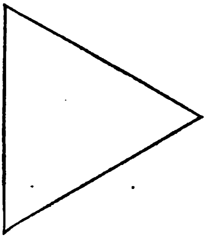


What figure have you made? *A triangle.* What kind of angles has it? *One obtuse angle and two acute angles.* Every triangle which has an obtuse angle may be called an obtuse angled triangle.

What is an obtuse angled triangle? *A triangle that has an obtuse angle.*

Take another model and draw from it.

What kind of angles have we in this triangle? *Three acute angles.* It is, therefore an acute angled



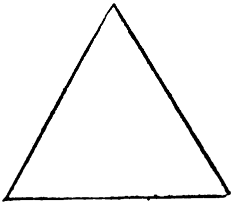
triangle. What is an acute angled triangle? *One that has three acute angles.*

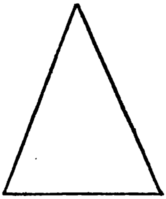
Draw three obtuse and three acute angled triangles.

LESSON VI.

TRIANGLES—THE ISOSCELES, THE EQUILATERAL, AND THE SCALENE.

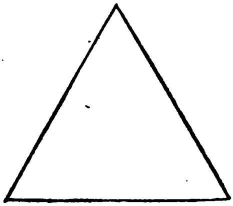
Furnish the class a model for an isosceles triangle. Let them draw and define it.





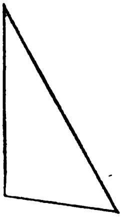
An isosceles triangle is one that has two equal sides.

Then draw for the class a model of an equilateral triangle. Let them make and define it.



An equilateral triangle is one that has its three sides equal to each other.

Also a scalene.



A triangle is called scalene when its three sides are unequal.

LESSON VII.

REVIEW.

Draw from memory and define a right angled triangle, an obtuse angled triangle, and an acute angled triangle.

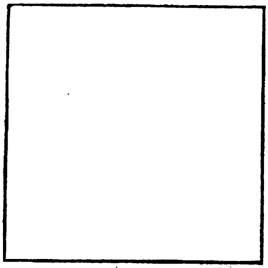
FOUR-SIDED FIGURES.

LESSON VIII.

THE SQUARE.

Make points for the square six inches apart on the board.

Give the class sufficient practice in drawing it.



What figure have you drawn? *The square.* How does it differ from the triangle? *It has one more side and one more angle.* Are its four sides equal or unequal? *Equal.* What kind of angles does it contain? *Right angles.* What is a square, then? *A figure that has four equal sides and four right angles.*

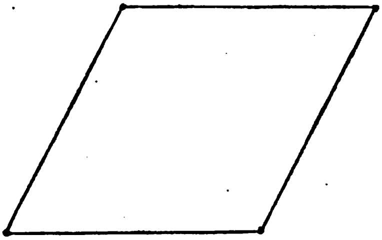
Draw several squares each, without the model.

LESSON IX.

THE RHOMB.

This is a new figure. You see the sides are of equal length. You notice how I have arranged the points. Draw six each.

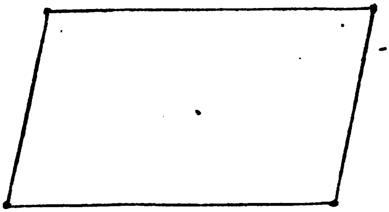
In what respect is this figure like the square? *It has four equal sides.* In what respect is it unlike



the square? *Its angles are not right angles.* What sort of angles are they, then? *Two are obtuse angles and two are acute angles.* A rhomb, then, is a figure which has four equal sides and two obtuse and two acute angles. All repeat.

LESSON X.

PARALLELOGRAM.

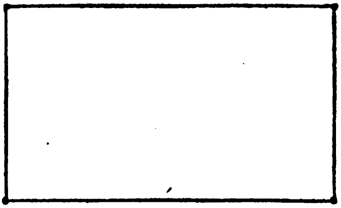


Another new figure. Look at it carefully. Compare it with the square and what difference do you see? *The sides are not equal.* Compare the oppo site sides with each other and what then? *The opposite sides are equal.* Look again and you will see that they are also parallel. Draw six parallelograms each.

Now what is a parallelogram? *A figure of four sides, the opposite sides being parallel and equal.*

Notice that in a parallelogram we say nothing about the angles. In fact it makes no difference whether the angles are all right angles or two of them obtuse and two acute, *if only the opposite sides are parallel.*

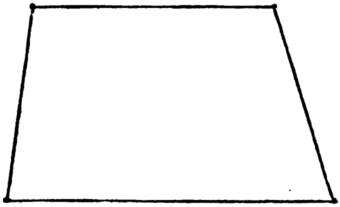
Here is another parallelogram which you may draw.



The opposite sides, you see, are parallel. What are the angles? *Right angles.* On that account we call this figure a right angled parallelogram or a rectangle. What is a rectangle? *A parallelogram having four right angles.*

LESSON XI.

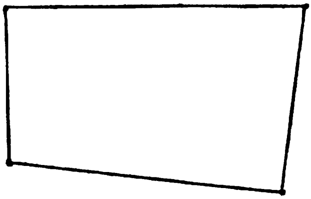
TRAPEZOID.



A trapezoid is a four-sided figure having two of the opposite sides parallel.

LESSON XII.

TRAPEZIUM.



The trapezium is a four-sided figure with the opposite sides not parallel.

LESSON XIII.

REVIEW.

Draw from memory and define a square, a rhomb, *a parallelogram.*

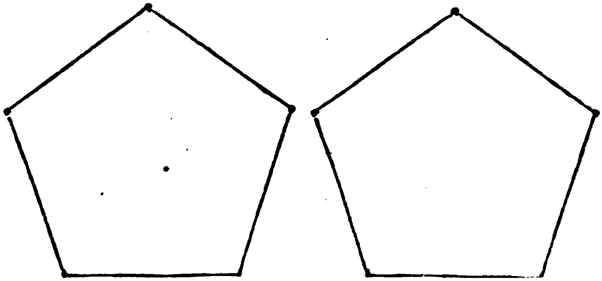
A rectangle, a trapezoid, a trapezium. Mention some things shaped like the square. *The Atlas. A picture frame. One side of the dictionary. A handkerchief.* Think of something shaped like a rectangle. *A book. A slate. The door. Half a sheet of letter paper. The table.*

POLYGONS.

LESSON XIV.

THE PENTAGON.

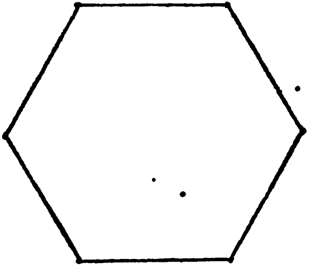
In drawing the pentagon let the pupil be guided by points properly placed.



How many angles in this figure? *Five.* How many sides? *Five.* Well, this is a pentagon or five-sided figure. What is a pentagon, then? *A figure that has five angles and five sides.*

LESSON XV.

THE HEXAGON.

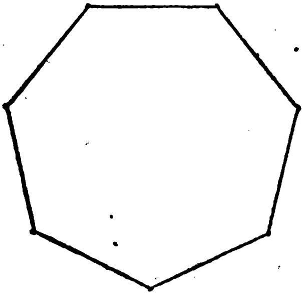


This figure is a little different from the pentagon. How many sides has it? *Six.* How many angles? *Six.*

It is called a hexagon. What is a hexagon? *A figure that has six angles and six sides.*

LESSON XVI.

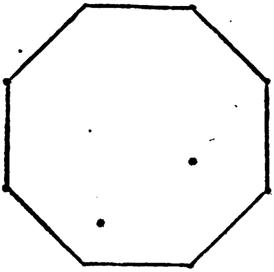
THE HEPTAGON.



Count the angles and sides of the figure we have drawn now. *Seven angles and seven sides.* How many sided? *Seven sided.* It is called a heptagon. What is a heptagon? *A figure that has seven angles and seven sides.*

LESSON XVII.

THE OCTAGON.

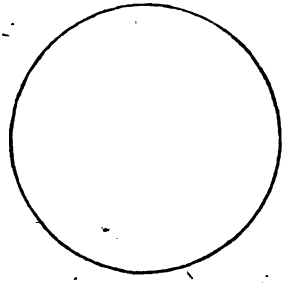


How does this figure differ from the heptagon? *It has one more side and one more angle.* It is an octagon. What is an octagon? *A figure that has eight sides and eight angles.*

LESSON XVIII.

THE CIRCLE.

Draw the circle by the same arrangement of points as in the square. The class will need the time for practice in drawing this figure usually assigned to two lessons.

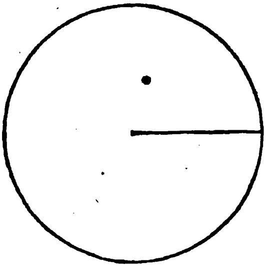


Its properties may be impressed by the following questions: What is this figure called? *A circle.* Here is a quarter of a dollar; what is the shape of it? *It is a circle.*

Well, the distance round the edge, on the outside, is called its circumference. Look at the bottom of the water-pail; what is *its* shape? *The shape of a circle.* What is its circumference? *The distance round the edge on the outside.* Now if we could find a point in the middle that would be equally distant every way from the outside, we should call it the center of the circle. William, put your finger on the center of this circle. Jane, here is the bottom of a tin cup that is a circle. What is its circumference? *The distance round the outer edge.* Try to put your pencil on the point that is the center of this circle. Very well. [*The teacher now takes a piece of twine six inches in length, ties one* *end to a crayon, and holding the other end firmly on the board, draws a true circle.*] What is the center of this circle? *The point where the string was held still.* What is the circumference? *The line drawn by the crayon in going round the center.* What is the distance from the center to every part of the circumference? *The length of the string.* A circle, then, is a figure whose circumference is everywhere equally distant from a point called the center. Repeat.

LESSON XIX.

THE RADIUS.



The teacher and pupils draw several circles with the crayon and string.

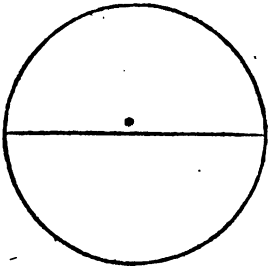
Tell me the distance from the center of this circle to all parts of the circumference. *The length of the string used in drawing them.* Why? *Because the string measures the distance from center to circum-*

ference. Well, the distance from the center to the circumference of any circle, is called a radius. Draw a straight line from center to circumference in the circles you have made.

What is this line called? *A radius.* Draw another in a different direction. Two or more are called *radii.* You see that all radii have the same length and are therefore equal.

LESSON XX.

THE DIAMETER.

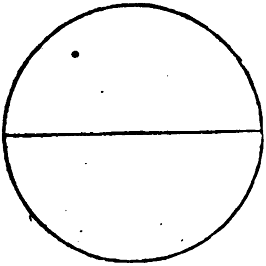


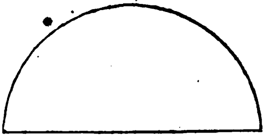
Teacher draws a circle with a radius.

What have we now? *A circle and a radius.* Suppose we draw a radius to the opposite side of the circumference in the same line or direction with this radius. What have I done now? *Divided the circle into two equal parts.* Well, any straight line *that* passes through the center of a circle to opposite points in the circumference, divides the circle into two equal parts. This line is called the diameter of the circle. What is the diameter of a circle, then? *A straight line passing through the center to opposite points in the circumference.* How many radii is the diameter equal to? *Two.*

LESSON XXI.

THE SEMICIRCLE.





Draw several circles and their diameters.

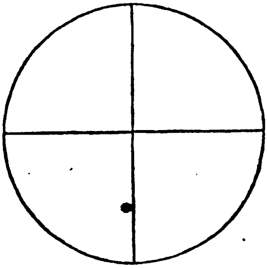
We found that the diameter divides the circle into two equal parts. What part of a whole circle is each one of these? *A half.* The word *semi* means half. What may we call one of these parts, therefore? *A semicircle.* How many semicircles in a whole circle? *Two.* Draw several semicircles.

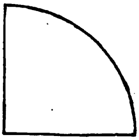
Now draw several circles and divide them into *semicircles.*

LESSON XXII.

THE QUADRANT.

Make a circle with a horizontal diameter.





What have we here? *A circle with its diameter.* How many semicircles? *Two.* Draw a radius perpendicular to this diameter and it will, as you see, divide the semicircle into two equal parts. Now draw a radius downward in the same straight line with the last and how many parts have we divided the lower semicircle into? *Two equal parts.*

How many such parts have we in the whole circle? *Four.* What part of the whole circle, then, is each one of these? *A quarter of the whole circle.* The word *quadrant* means *quarter.* What may we call each of these quarters, then? *A quadrant.* How much of the circumference of the circle is there in each quadrant? *A quarter.* How is each quadrant bounded? *By two radii and a quarter of the circumference.* What kind of angle do the radii make? *A right angle.*

In this way the teacher may, if he thinks proper, teach the nature of the tangent, sine, cosine, secant, etc.

SOLIDS.

IN DRAWING LESSONS OR FROM MODELS IN WOOD.

Wooden models of some of the more simple of the regular solids, will be needed for the following lessons. Any teacher who is accustomed to use carpenters' tools, can make them for himself. Otherwise, they can be made without much expense by the nearest mechanic. A large assortment of such models can be obtained from Holbrook & Co., Hartford, Ct., or from Sherwood & Co., Chicago. These firms have agencies in all our large cities.

Perhaps the figures of solids to be presented, will be too difficult for models in drawing. If so, they should be taught simply from the models of wood.

LESSON I.

A SOLID.

Here is a glass full of water. Suppose I try to put more water into the glass? *It will run over.* What if I turn the glass a little? *The water will run out.* Can you think of any other things that would do this? *Yes, sir; milk, or oil, or molasses.* Well, things like water that always run down hill when there is nothing to prevent them, and change their shape easily to fit the vessel that holds them, are called *fluids.* What is vinegar? *A fluid.* Why? *Because it runs easily like water and changes its shape to fit the cruet.* Well, there are a great many things that do not change their shape easily. Here is a piece of chalk; when I put it into the glass does it change its shape and fit the glass like water? *No, sir.*

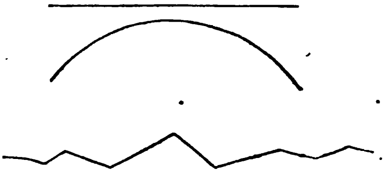
Anything that does not easily change its shape is a solid. Think of some other things that are solids. *A stone. A book. The table. My knife.*

Very well; here is an egg—is it a solid or a fluid? *A solid.* If I break the shell does it not run? *Yes, sir; the shell is a solid but the inside is a fluid.*

LESSON II.

EVERY SOLID BOUNDED BY LINES.

I have drawn three lines on the board; tell me what lines they are.



One is a straight line, one is a curve, and one is a crooked line.

What is a straight line? *The nearest way or distance between two points.* [*Teacher illustrates by two points on the board, making several curves and one straight line between them.*] What is a curved line or curve? *A line that changes its direction equally at every point.* Look now at the crooked line; you see it is made up of very small curves and bits of straight lines all mingled together, so that the whole line changes its course unequally at different points. What, then, is a crooked line? *A line that changes its course unequally at different points.* [*Illustrate by making examples.*]

Which of these lines can you measure exactly? *The straight line and the curve.* Why can you not measure the crooked line? *The rule would not fit it.*

Everything solid is bounded by lines, straight, curved, or crooked. Open the door and look at its edges; are they straight, curved, or crooked? *Straight.* Yes; whether you look at the top, bottom, or side, it is still straight. What lines bound the door, then? *Straight lines.* Look at the stovepipe; what lines bound it up and down? *Straight lines.* What lines run around it? *Curved lines.*

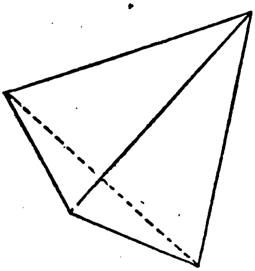
Here are some solids—a stone, a brick, and a globe. Look at the stone as I hold it up; what lines run around it every way? *Crooked lines.* Notice the brick; what lines run along the outside? *Straight lines.* Now the globe; what line surrounds it? *A curved line.* What sort of curve is it? *The circumference of a circle.*

You remember we can measure straight lines and curves, but can not measure crooked lines. Now such solids as the brick and globe, being bounded by straight or curved lines, can, for that reason, be measured; but the stone, being bounded by crooked lines, can not be measured. [*Illustrate with the rule.*]

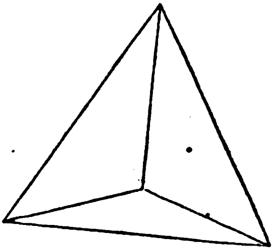
LESSON III.

THE SOLID ANGLE.

All the angles that you have drawn as yet, have been made by two lines meeting on a plane or flat surface. A surface, you know, is the outside of anything. The outside of the table is its surface. Here is the surface of the blackboard. Tell me of some other surfaces. *The surface of the desk—the stone—the door.* Well, a plane surface is such that, if you lay a straight line on it in any direction, every part of the line will touch the surface. The edge of this ruler is a straight line; see me lay it on the surface of the table several ways; does every part of the edge touch the table? *Yes, sir.* What kind of a surface is it, then? *A plane surface.* Try the globe in the same way; has it a plane surface? *No, sir.* Try the blackboard; what surface has it? *A plane surface.* What other plane surfaces do you see? *The wall. The slate. The cover of the book.* Very well; now I will tell you that all the figures that we have been making have been drawn on a plane surface, and are called plane figures. [*Illustrate by drawing a figure on the board.*] What, then, is a plane angle? *An opening made by two lines meeting on a plane surface.* Now I can show you what a solid angle is. It is made up of three or more plane angles meeting at one point. Here are three pieces of card cut so as to represent three plane angles. I will put them together so that the three angles meet at one point, thus:



or thus:



This, too, is a solid angle. [*Shows the class the angle of a cube.*]

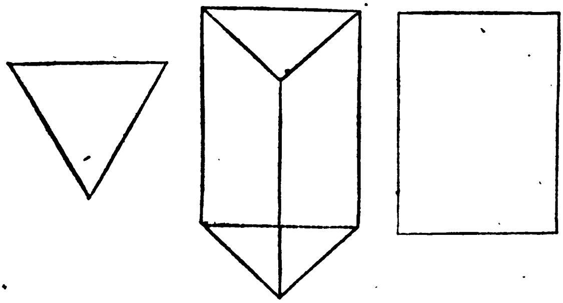
What kind of plane angles make up this solid angle? *Right angles.* [*The teacher shows a variety of solid angles.*]

LESSON IV.

THE TRIANGULAR PRISM.

This is a beautiful solid. How many surfaces has it? *Five.* Yes—three sides and two ends.

What sort of surfaces are they? *Plane surfaces.* By what lines are they bounded? *Straight lines.*



What is the shape of each end? *It is a triangle.* What is the shape of each side? *It is a parallelogram.* How many solid angles has this solid? *Six.* Of what kind of plane angles is any one of these solid angles formed? *Of two right angles and one acute angle meeting at one point.*

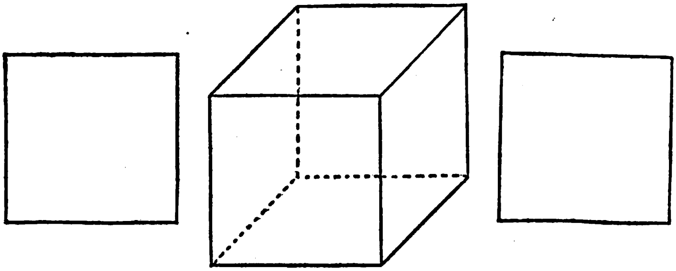
Look at the ends of this solid again. Notice, once more, that they are equal triangles, and that the three straight lines that bound the sides and touch each angle of the two triangles are of equal length. The two triangles, then, are everywhere the same distance from each other. What can you say of them in view of this fact? *They are parallel.* And what, again, is the shape of each side? *It is a parallelogram.*

Well, any solid whose ends are equal, alike in *shape, and* parallel to each other, and whose sides are parallelograms, is called a *prism*. Repeat carefully.

Now give me the different reasons why this solid is called a prism; first, as to the ends? *They are alike.* Why? *Because they are both equilateral triangles.* The next reason? *They are equal.* Why? *Because the sides of both triangles are of equal length.* The third reason? *These two triangles are parallel to each other.* The fourth reason? *The sides between the two triangles are parallelograms.*

LESSON V.

THE QUADRANGULAR PRISM.



Another solid for this lesson. How many surfaces has it? *Six surfaces.* How many sides and ends? *Four sides and two ends.*

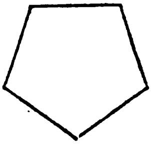
What kind of figures are the ends? They are *squares.* Why? *They have four equal sides and four right angles.* Is one square larger than the other? *No, sir; they are equal.* Now these four edges or lines bound the sides and touch every angle of the square. Are they equal or unequal? *Equal.* The squares, then, are everywhere equally distant from each other; what of that? *They are parallel to each other.* And now what is the form of each of the four sides? *It is a parallelogram.*

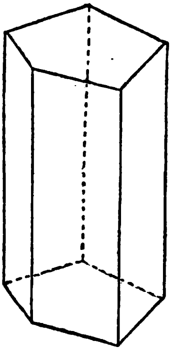
Tell me again what a prism is. *It is a solid whose ends are alike and equal and parallel and whose sides are parallelograms.* What is this solid, then? *A prism.* Well, quadrangular means *having four angles.* How many angles have the ends? *Four.* What may this prism be called, then? *A quadrangular prism.* How many solid angles has this prism? *Eight.* How are they made? *By three right angles.* Let us now put this prism out of sight and review the lesson from memory.

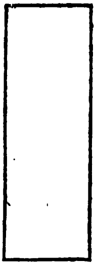
LESSON VI.

FIVE-SIDED PRISM.

Count the surfaces of this solid. *Seven—five sides and two ends.* What are the ends? *Equal pentagons or five-sided figures.* What else can you tell me about them? *They are parallel.* What are the



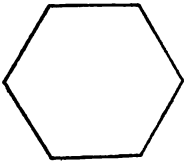


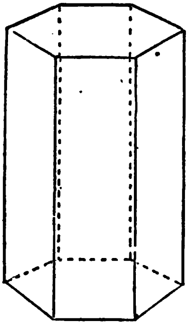


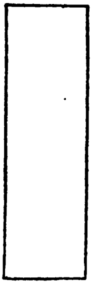
five sides? *Parallelograms.* What is this solid, then? *A prism.* And as it has five sides, we may call it a five-sided prism.

LESSON VII.

SIX-SIDED PRISM.







How many sides? *Six.* What are the ends? *Two equal sexagons.* What further? They are *parallel.* What are the sides? *Parallelograms.* What is this solid, then? *A six-sided prism.*

Notice that the ends always have as many line-sides as there are surface-sides in the prism.

LESSON VIII.

REVIEW OF PRISMS.

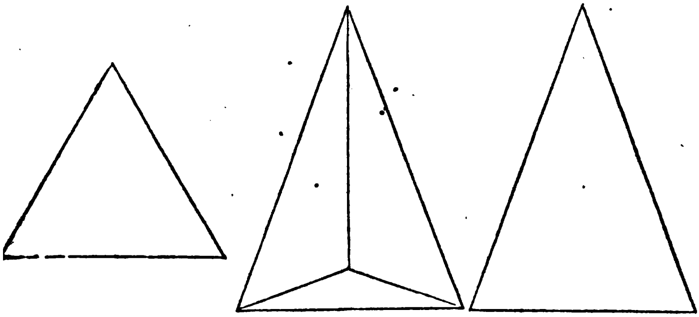
Answer the questions in this lesson without the models. What is a prism? What is a triangular prism? A quadrangular prism? A five-sided prism? A six-sided prism? How many line-sides will the ends of a prism have? How do you know that the planes of the two ends are parallel?

LESSON IX.

THE TRIANGULAR PYRAMID.

Here is a new solid different from the prism. How many surfaces has it? *Four.* What are these surfaces? *Triangles.* Look at the sides of one of these triangles; are they equal or unequal? *Equal.* What kind of triangles are the surfaces of this solid, then? *Equilateral triangles.* How many solid angles has this solid? *Four.* How are they formed? *By three acute angles meeting at the same point.*

Place this solid on the table. The surface that it stands on, is called its base. Now how many sides has it? *Three.* What kind of sides? *Triangles.* Where do the sides or triangles meet? *At the top.* Well, the top where the triangles meet is called the vertex. Look at the base again; how many sides has it? [*The teacher should point out carefully the difference between surfaces and sides of lines. The sides of a plane figure may be called line-sides, while the sides of a solid may be called surface-sides.*] *Three.* Well, the base will always have as many line-sides as there are surface-sides in the solid. Count and see.

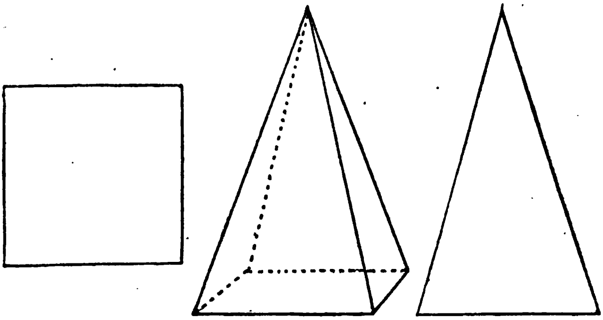


Shall I tell you the name of this solid? It is a pyramid. A pyramid is a solid whose sides are three or more triangles meeting, as you see, in a point called a vertex, and whose base is a plane *figure like this*, bounded by lines which form the bases of the triangles. [*Teacher reviews each of the above particulars.*]

Pyramids are always named from the shape of the base. What is the shape of this base? *Triangular.* What sort of pyramid is this, then? *A triangular pyramid.* Notice that this solid is of such a form that we can take any side as the base.

LESSON X.

THE QUADRANGULAR PYRAMID.

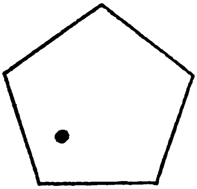


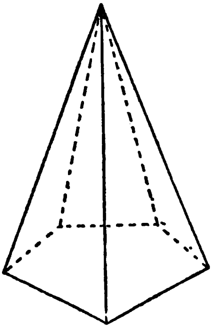
Another pyramid. How many surface-sides has it? *Four.* What are they? *Triangles.* What kind? *Isosceles.* Where do these triangles meet? *At the vertex.* Now look at the base. How many line-sides has it? *Four.* If the base of each triangle, *as you* see, forms one line-side of the base of the pyramid, how many line-sides must the base have? *Four.*

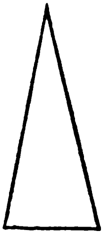
As the base has four line-sides and four angles, what may this pyramid be called? *A quadrangular pyramid.*

LESSON XI.

THE PENTANGULAR PYRAMID.







Describe this pyramid; first as to the surface-sides. *It has five isosceles triangles meeting at the vertex.* Next as to the base. *Its base is a pentagon. It has five line-sides, and each side is the base of one of the triangles.*

As the base is a pentagon and has five angles, we may call this pyramid a pentangular pyramid.

Review these particulars thoroughly.

LESSON XII.

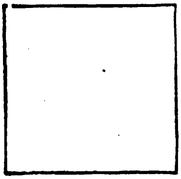
REVIEW OF THE PYRAMIDS.

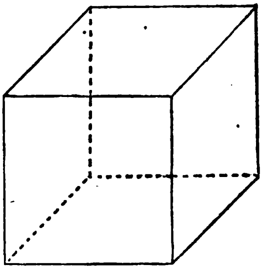
(WITHOUT THE MODELS.)

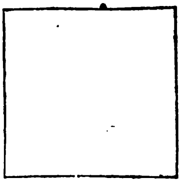
What is the least number of surface-sides that a pyramid can have? What shape must every side have? Where will all the triangles that form the sides of the pyramid meet? How many line-sides must the base of a triangular pyramid have? What part of the triangles will these sides be? How many sides must a quadrangular pyramid have?

LESSON XIII.

THE CUBE.





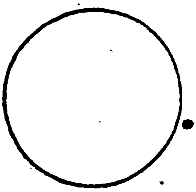


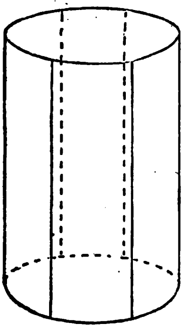
How many surfaces has this solid? *Six.* What kind of surfaces are they? *Plane surfaces.* Look *at one; what* is its shape? *It is a square.* What is a square? *A plane figure that has four equal sides and four right angles.* How do these six sides compare with each other as to size? *They are all equal.* This solid is called a cube. A cube is a solid with six sides which are equal squares.

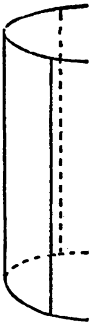
How many solid angles has the cube? *Eight.* How are they formed? *By three right angles meeting in a point.* Tell me again what a cube is.

LESSON XIV.

THE CYLINDER.







What kind of surfaces has this solid? *A surface like a circle on the sides and two plane surfaces at the ends.* What kind of lines would fit the side crosswise? *Curved lines.* Well, we will call the side a curved surface, then. Here are several curved surfaces. [*Showing a globe, a hemisphere, a half-dollar.*] You see they are curved like curved lines. Now this curved surface of the sides is not divided as in the prism but is all one surface.

Notice the ends. What are they? *They are circles.* How do they compare in size? *They are equal circles.* Are they not an equal distance apart? *Yes, sir; they are parallel.*

Again looking at the side of this solid carefully, we see that its diameter or distance through the center is everywhere the same as the diameter of the circles at the ends.

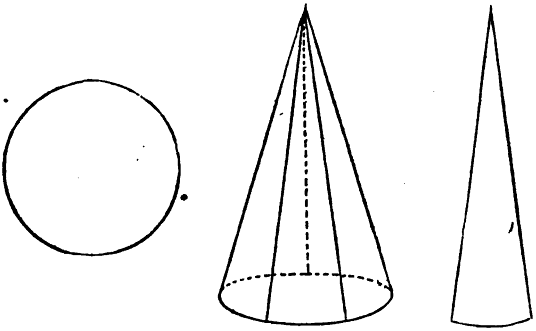
This solid is a cylinder. A cylinder is a circular solid whose diameter is everywhere the same, and whose ends are equal parallel circles.

LESSON XV.

THE CONE.

Have you ever seen anything like this solid? James. *Yes; it is like the steeple on the church.* Susan. *It is exactly like a sugar-loaf.* Very well; let us see in what respect it is like a pyramid. *It comes to a point called the vertex like a pyramid, and has a plane surface for a base.* But you see it is not shaped like the base of a pyramid.

In what respects is this solid like a cylinder? *It has a plane surface for* its base, which is *circular* *like one end of a cylinder, and it rises from its base with a curved surface that tapers to a vertex.*

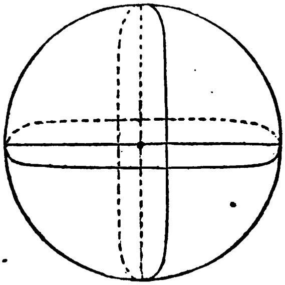


This solid is a cone. A cone has a circle for its base and rises with a curved surface to a vertex. Repeat.

LESSON XVI.

THE SPHERE.

Here is an interesting solid. You see it is not divided into different surfaces like the other solids which we have studied, but is surrounded by a single surface. What sort of a surface has it? *A curved surface.* Look at it as I hold it up, and suppose a line to run around it on its surface, what would such a line be? *The circumference of a circle.* Now look at it on this side, and now on *this, and* what do you see? *The circumference of* *a circle.* This solid, then, has a circular form in every direction.



This is called a sphere. What is the distance through the center from one side of it to the other called? *Its diameter.* And what do you call the greatest distance around it on the surface? *Its circumference.* You see that *this sphere* has holes running straight through its center in different directions: by thrusting this knitting-needle through these holes, thus, we can measure the different diameters. How do they compare in length? *They are equal.* Well, if I could, in the same way, measure from different points of the surface to the center, I should find the distance everywhere the same.

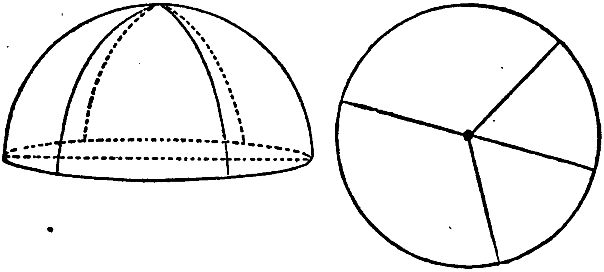
Here is a sphere which is cut through the center into two equal parts or halves. Taking these apart you see, on the inside of this one, a round dot of ink, which marks the center of the sphere. You see, too, the straight ink lines running every way on the plane surface from the center to the circumference. These lines are the radii of the sphere. Measure them. You see they are all equal, and so, if we could divide the sphere still further, so as to measure lines running from center to circumference at right angles to these, we should find them the same length.

A sphere, then, is a solid bounded by a single surface, so curved in every direction that the distance from the center to the circumference,is everywhere the same.

What things can you think of that are spheres in shape?

LESSON XVII.

THE HEMISPHERE.



You saw in our last lesson that this sphere was divided into two equal parts. What part of the *whole sphere* is one of these parts? It is half the *sphere.* The word *hemi* means half; what, then, may we call one of these parts? *A hemisphere.* How many surfaces has this hemisphere? *Two, a curved surface and a plane surface.* What is the shape of the plane surface? *It is a circle.* Well, you see, by putting the two hemispheres together, that the circumference of this circle is the same as the circumference of the sphere.

LESSON XVIII.

REVIEW.

(WITHOUT THE MODELS.)

How many surfaces has the cylinder? What kind of surfaces are they? What is the shape of the ends? How do these circles compare in size? What can you say of their position in respect to each other? What is a cylinder?

How many surfaces has the cone? What kind are they? What is the shape of the base? Where does the curved surface end? What is a curve?

How many surfaces has the sphere? What kind of a surface is it? What is the distance through the center of the sphere called? What is the greatest distance around the surface called? How do the radii of the sphere compare in length?

SPELLING BY OBJECT LESSONS.

For the following lessons, each pupil should be furnished with a pencil and a slip of paper or a slate. The object selected for the exercise should be held up in view of the whole class, and the teacher may proceed in the lesson according to the scheme below. As each property or part is named, let the pupils write its name neatly in the proper place.

OBJECT ————.

General Properties {
————
————
————

Parts {
————
————
————
————
————
————

Properties of Parts {
————
————
————
————
————

Uses of Parts
______
______
______
______

General Uses
______
______
______
______

SPECIMEN OBJECT LESSON FOR SPELLING.

Draw the plan for writing the words which the lesson will furnish, and direct the class to copy it on their papers. Then, when their attention is called to any part or property, request them to write its name in the right place.

What do I hold in my hand? *An apple.* What is its shape? *Round or spherical.* Yes, nearly spherical, though you see it is indented at the ends. What is its color? *Light green.* Are all apples light green? *No; some are dark green, some are red, some are russet, and some nearly white.* Right. I have here on my desk a dozen apples of different colors. Name the color of each as I show it to you. [*Pupils name the colors.*]

What do you name this part that I am now holding the apple by? *The stem.* The part opposite the stem is called the bud end.

I will cut the first apple into two equal parts. What are these parts called? *Halves.* If the whole apple is a sphere, what should we name each of the halves? *A hemisphere.*

Now let us examine carefully the inside of this half. In the first place, what is this thin part that covers the entire apple called? *The skin.* What is this large part that extends from the skin to the center called? *The pulp.* What do we find near the center of the apple? *The seeds.* Now every seed, you see, lies in a little sheath called a cell. What do we name the seeds and cells together? *The core.*

Now read all the names of the parts that you have written down. *Stem, bud, skin, pulp, seed, cell, core.*

We will next examine the stem. Is the stem easily broken? *No.* What shall we call it in view of that fact? *Tough.* James, what is the stem made of? *It is made of wood.* Well, then, it is *woody.* Again, you see I can divide it lengthwise, with my penknife, into small pieces, which look like bits of string. These pieces are *fibers,* and because the stem is made up of fibers, it may be said to be *fibrous.*

Look now at the skin; you see it has a shining appearance. That is, it is glossy. I will peel off a piece. Look at it carefully and tell me all about it. (George) *It is thin.* (Mary) *It is smooth.* (William) *It is tough.*

What of the pulp? (Class) *It is white. It is soft. It is juicy. It is thick.* How does it taste? *Sweet.* Are all apples sweet? *No, sir; some are sour and some are tart.* The pulp, you see, is good to eat, and whatever is good to eat is *nutritious.*

Here are several seeds; I will cut one in two. What is it composed of? *Of a shell and meat.* Look closely at the shell and tell me all you see. *It is black and glossy.* What further? *It is smooth.* Does it yield easily to the touch of a knife or pin? *No, sir; it is hard.* Can it be easily torn like paper? *No, sir; it is tough.* Does it taste like anything? *No.* Then it is *tasteless.*

The shell, then, is black, glossy, smooth, hard, tough, and tasteless.

Take a bit of the meat, each one of you. What can you say of it? *It is white and smooth. It is hard.* Can it be easily broken? *Yes, sir.* Well, anything that is easily broken is called *brittle.* How does it taste? *Bitter.*

Last of all we have the cell. I have cut one out for each of you. What are its properties? (Class) *It is white, and thin, and hard, and tough, and tasteless.*

Beginning with the stem again, let us ask what is its use to the apple? *The apple hangs on the tree by its stem.* Right. What is the value of the skin? *It surrounds the apple and keeps it safe from harm.* Right again; water can not get through the skin, so it keeps the rain out of the apple and also prevents the pulp from drying up. Now give me the uses of the pulp. *It is good to eat.* Is it good for nothing else? (Henry) *It covers the seeds and keeps them safe.* True; this is its greatest use. Now as to the cells. They also envelop the seeds and keep them safe. So you see that all the other parts of the apple are made simply for the seeds. First, the cells inclose the seeds, and lest these should be injured, they are again inclosed by the pulp, and that the pulp may be preserved, it is covered by the skin. Surely the seeds must be very valuable when all this pains is taken for their safety and growth. Can you tell me what their value consists in? *Yes, sir; new trees grow from the seeds, and if all seeds were destroyed there would be no more trees after these we have now, should die.* True. The seeds, then, are the most important of all the parts of the apple, because new trees will grow from them and, for this reason, all the other parts of the apple are made to protect the seeds.

AN APPLE.

Gen. Prop.	Form	Round or spherical.
	Color	Light green.

Parts
- stem
- bud end
- skin
- pulp or meat
- seed
- cells
- core.

- Properties of Parts
  - Stem
    - tough
    - woody
    - fibrous.
  - Skin
    - glossy
    - thin
    - smooth
    - tough.
  - Pulp
    - white
    - soft
    - juicy
    - thick
    - sweet
    - nutritious.
  - Seeds
    - Shell
      - black
      - glossy
      - smooth
      - hard
      - tough
      - tasteless.
    - Meat
      - white
      - smooth
      - hard
      - brittle
      - bitter.
  - Cells
    - white
    - thin
    - hard
    - tough
    - tasteless.
- Uses
  - Apples hang by the stem.
  - The skin keeps the apple safe from harm.
  - The pulp is good to eat.
  - The pulp covers the seeds and keeps them safe.
  - The cells envelop the seeds.
  - New trees grow from seeds.

LESSON II.

AN EGG (BOILED).

General Properties
- Shape . . . Oval.
- Color . . . White.

Parts
- shell
- skin
- white
- yolk.

Properties of Parts
- Shell
  - white
  - smooth
  - dull
  - opaque
  - thin
  - brittle
  - fragile
  - outside
  - inside.
- Skin
  - white
  - thin
  - tender
  - translucent.
- White
  - white
  - glossy
  - smooth
  - elastic
  - nutritious.
- Yolk
  - globular
  - yellow
  - opaque
  - eatable
  - nutritious.

Uses
- All the other parts of the egg are made for the safety of the yolk, because the yolk is the part that a chicken is hatched from.
- Eggs are nutritious.

LESSON III.

A BOOK.

- General Properties
  - black (edges white)
  - square
  - solid.

- Parts
  - sides
  - back
  - edges
  - corner
  - top
  - bottom
  - outside
  - inside
  - covers
  - title
  - author (name)
  - printer (name)
  - leaves
  - blanks
  - pages
  - title page
  - preface
  - contents
  - index
  - introduction
  - chapters.

- Properties of Parts
  - Sides
    - black
    - parallelograms
    - of cloth.
  - Back
    - stiff
    - strong
    - gilt.
  - Covers
    - inside of pasteboard
    - outside of cloth
    - stamped
    - figured.
  - Leaves
    - thin
    - firm
    - light
    - smooth
    - absorbent.
  - Blank Leaves
    - white
    - opaque
    - pure
    - clean.
  - Pages Contain
    - number
    - type
    - margin
    - paragraphs
    - sentences
    - clauses
    - periods
    - colons
    - semicolons
    - commas.

Uses—to be given by the teacher.

LESSON IV.

GRANITE.

- General Properties
  - gray
  - hard
  - heavy
  - rough
  - tough.
- Parts
  - quartz
  - feldspar
  - mica.
- Properties of Parts
  - Quartz
    - white
    - glassy
    - irregular
    - shapeless
    - rough
    - hard
    - gritty.
  - Feldspar
    - light red
    - dull
    - polished
    - opaque.
  - Mica
    - whitish
    - glistening
    - laminate
    - thin
    - flaky
    - translucent.
- Uses
  - Granite is used for making walls.
  - Many buildings are of granite.
  - Cellar walls are often built of granite.
  - Monuments for the dead are sometimes made of granite.
  - When used for buildings, granite is often cut into square blocks.

LESSON V.

A KNIFE.

- General Properties
  - long
  - square
  - solid
  - brown.
- Parts
  - handle
  - blades.
- The Handle is made of
  - springs
  - plates of brass
  - horn
  - rivets
  - pivots
  - steel pieces at the ends.
- Parts of Blade
  - sides
  - edges
  - points
  - back
  - grooves.
- The Springs are
  - gray
  - steel
  - hard
  - stiff
  - elastic
  - smooth.
- The Plates of Brass are
  - yellow
  - flat
  - thin
  - strong.
- Pieces of Horn
  - brown
  - rough
  - hard
  - tough.

Rivets
- cylindrical
- small
- iron
- strong.

Steel pieces
- bright
- smooth
- thick.

Uses
- We use the blade of a knife to cut with.
- We hold a knife by the handle.
- The blade of a knife is fastened to the handle.

What are the different kinds of knives?

LESSON VI.

THE HAND.

General Properties
- white
- flexible
- strong
- grasping
- useful.

Parts
- palm
- back
- fingers
- thumb
- skin
- lines
- veins
- nails
- flesh
- cords
- bones
- joints.

Palm
- flesh-colored
- hollow
- tough
- yielding
- marked.

Back
- white
- veined
- hairy
- smooth.

Fingers	long round flexible jointed.
Thumb	short strong two-jointed.
Skin	white flesh-colored external thick on the palm thin on the back wrinkled at the joints.
Lines	long crooked broken irregular.
Veins	blue round long crooked hollow.
Nails	flesh-colored white at roots and ends hard horny translucent convex outside, concave inside.
Flesh	soft yielding elastic tough.
Cords	long round tenacious hard compact elastic.
Bones	white solid stiff hard inelastic inflexible unyielding.
Joints	of bone bending inward strong.

Uses of some of the parts

- The palm of the hand is useful for holding things.
- The fingers are used to take hold of things.
- We feel with the ends of the fingers.
- The thumb and fingers are used to grasp whatever we take hold of.
- The skin covers the hand and protects it.
- The veins carry the blood from the hand to the heart.
- The nails strengthen the ends of the fingers.
- The flesh gives shape and fullness to the hand.
- The cords and joints enable us to open or shut the hand.
- The cords are fastened to the bones.

LESSON VII.

A LEAF (OF THE FLAG, LILY, OR CORN).

I have gathered some leaves for our lesson to-day. You see they are similar in form, being all long, narrow, and tapering. Can you tell what they are shaped like? *Like a sword.* Right; for this reason they are said to be sword-shaped. Now take one, each of you, and examine the back of it closely. *You see this* ridge or line which runs through the center from the base to the point. This line is a vein, and because it runs through the middle of the leaf it is called the mid-vein.

Take another look. What else do you see? *Smaller lines on each side of the mid-vein running the same way.* Well, they are called simply veins. Observe they are all the way the same distance apart. What shall we say of them from this fact? *They are parallel.* True. All leaves whose veins run parallel like these, are named parallel veined leaves. Review and write.

General Properties	sword-shaped green.	Parts	blade mid-vein veins.
Parts of Blade	base point edges.	Mid-vein	raised central straight.
Veins	small straight parallel.		

LESSON VIII.

A LILAC LEAF.

Another kind of leaf to-day. I have gathered from a lilac bush samples enough for all of you. The entire edge of a leaf is called its outline. Look at the outline of this leaf. What is it like in shape? *A heart.* Yes, somewhat like a heart, and so it is said to be heart-shaped. The broad part of the outline next to the stem is the base of the leaf, and the point opposite is its apex. Examine the back carefully. What is this large line which runs from the base to the tip and seems to be a continuation of the stem? *The mid-vein.* And these smaller lines that run off from the mid-vein? *They are veins.* By looking closely you will see a great number of still smaller lines running off from the veins. These are called veinlets.

Now notice that the veins are not parallel with the mid-vein nor with each other, like those of the lily. They branch off from the mid-vein at an acute angle, and the veinlets branch off from the veins at the same angle, making the whole framework of the leaf look like a net. Such leaves are said to be netted-veined.

General Properties
- egg-shaped
- green
- netted-veined.

Parts
- stem
- base
- apex
- mid-vein
- veins
- veinlets.

LESSON IX.

A TUMBLER.

We will name, in regular order, the properties of a tumbler. I have dropped a bit of pencil into it. Can you see the pencil? *Yes, sir.* How? *Through the sides of the tumbler.* Suppose I place a sheet of paper before the tumbler. Can you see the pencil now? *No, sir.* Right. Anything, then, that you can see objects through is said to be transparent, while anything that, like the paper, hides an object from your sight is said to be opaque. Think of a number of things that are transparent. *Glass, water, soap bubbles.*

There is another próperty of the tumbler which you have never studied. If I pour water on this bit of sponge what will become of it? *It will soak in.* What if I pour it on this paper? *It will wet through.* But if I pour it into the tumbler? *It will not soak in or wet through.* Anything that water will not enter is called impervious.

General Properties
- cylindrical
- colorless
- transparent
- impervious
- hard
- smooth
- brittle.

Parts
- top
- bottom
- ends, etc.

OBJECTS RECOMMENDED FOR FURTHER LESSONS.

Water.
Ink.
A pen.
A quill.
A hair.
A pencil.
A piece of wool.
A piece of chalk.
A pair of scissors.
A piece of bark.
A piece of leather.
A piece of wood (to show combustibility).
A candle.
A piece of horn (translucent).
A chair.
A thimble.
India-rubber (elastic).
Paper.
A cent.
A quarter of a dollar.
A postage stamp (adhesive).
A bell (sonorous).
A bird's claw.
A tooth.
A brick.
A pin.
Starch.
Sugar (nutritious).
Allspice.
Salt.
Sweet oil.
Alum.
Cloves.
Soap (cleansing).
Ginger.
Cinnamon.
Rice.
Mustard.
Pepper.
Coffee.
Tea.
Chocolate.
Wheat.
Flour.
Bread.
Indigo.
Camphor.
Raisins.
Mace.
Soda.
Cream tartar.
Vinegar.

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